The RUBBER AGE

April 1947

TECHNOLOGY DEPARTMENT

CUMATE

CUMATE alone or with **ALTAX** is being used in GR-S stocks extensively today. When natural rubber or reclaim is present the addition of AGERITE WHITE is desirable.

The use of CUMATE is growing for at least four reasons:

1. *Faster cures*
2. *Safe processing*
3. *Improved quality*
4. *Reduced manufacturing costs*

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York 17, N. Y.

For better resistance to heat and aging

Use Du Pont ACCELERATOR 2MT

ACCELERATED AGING TESTS show that the use of 2 MT in rubber stocks results in superior resistance to heat and oxidation. A comparison of the effect of 2 MT and MBT is shown in the data below. The heat resistance of the compositions was obtained by aging test specimens in an air oven at 212° F. Resistance to oxidation was determined by aging the stocks in an oxygen bomb, operated at 158° at 300 psi oxygen pressure.

TEST RECIPES

Compound	A	B
Smoked Sheets	100	100
Zinc Oxide	10	10
Stearic Acid	2	2
Neozone D	1	1
Sulfur	2.75	2.75
2MT	0.75	—
MBT	—	0.85
Cure: 60 min. at 267° F.		

The tensile strengths and elongations at break before and after aging are shown in Table I.

TABLE I

Compound Accelerator	Tensile Strength (psi) A 2MT	Tensile Strength (psi) B MBT	% Elongation at Break A 2MT	% Elongation at Break B MBT
Original	4300	4300	790	740
After aging 2 days at 100° C oven	2800	225	580	200
After aging 16 days in oxygen bomb	3100	1625	680	560

WHILE BOTH STOCKS exhibit practically identical original properties, the superior aging characteristics of the 2 MT accelerated stock are clearly shown by the fact that it retained a much higher proportion of the original strength and elongation than the MBT accelerated compound.

The advantage of accelerating with 2 MT is confirmed by the superior service of tires built from stocks containing it.

Other important advantages for Accelerator 2MT in rubber stocks are:

Exceptionally low heat build-up.
Outstanding resistance to flex-cracking.
Little tendency to revert during long curing.
Excellent resistance to tear at elevated temperatures.

These characteristics suggest the use of Accelerator 2 MT in all compounds for dynamic service where the vulcanizate is exposed to severe mechanical working such as in tires, belts and vibration dampeners.

Write us for specific recommendations on use of Accelerator 2 MT.

DU PONT
Reg. U.S. Pat. Off.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

RUBBER CHEMICALS DIVISION

New Report Available

"The Effect of Fuels Containing Aromatic Hydrocarbons on Neoprene Hose" describes results of simulated service tests on fuel line hose. Seven months' flexing on hose containing aromatic fuel produces little change in hose. Effect of one-side contact with aromatic fuel is compared with effect of total immersion. An interesting booklet. Extra copies available on request.

Neoprene Type NC

Neoprene Type NC is a new general-purpose elastomer which, in the unvulcanized state, is resistant to rapid mill-breakdown, thermal softening and collapse. These special properties make the use of neoprene Type NC advantageous in the manufacture of thin-walled extruded goods which must hold their shape during processing and curing, and for large-sized hose and low durometer molded products. Recommendations for the use of neoprene Type NC are contained in Report 47-2. Extra copies are available on request.

Reprinted Articles from Trade Magazines

1. **New Outlets for Rubber Through Latex—by Dr. C. J. Mighton,** *India Rubber World—February, 1947.*
2. **State of Cure of Neoprene Vulcanizates—by D. B. Forman and R. R. Radcliff,** *Industrial & Engineering Chemistry — October, 1946.*
3. **Neoprene Applications in Product Design—by S. W. McCune, III.** *Machinery, January and February, 1947.*
4. **Backrinding of Molded Products—by Embert L. Stangor.** *Rubber Age, January, 1947.*
5. **Coating of Air Duct Systems—** *Heating and Ventilating—January, 1947.*
6. **Vulcanization of GR-S with Halogen Compounds—by B. M. Sturgis, A. A. Baum, and J. H. Trepagnier—** *Industrial & Engineering Chemistry, January, 1947.*

Copies of all these reports and reprints may be obtained by writing to:

RUBBER CHEMICALS DIVISION
E. I. du Pont de Nemours & Co. (Inc.)
Wilmington 98, Delaware

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. April, 1947. Vol. 61, No. 1.

PERMANENT RESILIENCE

Resilient parts made from HYCAR synthetic rubber *stay* resilient. That's partly because of HYCAR's unusual chemical stability—its resistance to oil and gas, acids and most other chemicals. And parts made from HYCAR are extremely resistant to the effects of oxidation, sunlight, and normal aging. A HYCAR sealing ring, for example, will maintain a positive seal through years of service even when constantly exposed to oils and acids inside the pipe, and sunlight and salt air outside.

Other unusual and valuable properties are listed in the box at the right. But most important, these properties may be had in an almost limitless number of combinations, each designed to meet the specific service conditions of the finished part. Parts made from HYCAR have seen service in *every* industry, giving long life, dependability, and economical operation.

That's why we say ask your supplier for parts made from HYCAR. Test them in your own applications, difficult or routine. You'll learn for yourself that it's wise to use HYCAR for long-time, dependable performance. For more information, please write Dept. HB-4 B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

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1. **EXTREME OIL RESISTANCE** — *insuring dimensional stability of parts.*
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3. **ABRASION RESISTANCE**—*50% greater than natural rubber.*
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American Rubber

B. F. Goodrich Chemical Company
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Yes! Philblack A gives your finished product a longer and more useful life... greater resistance to cuts, cracks and abrasion. More resilience, too. Those are some of the reasons why Philblack A is so popular with the makers of tires. Actual performance has proved that tires and tubes made with Philblack A are sturdy... can withstand wear and tear!

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Calendered sheets and films—injection and compression moldings—coating for fabrics, fibers and papers—extrusions—all the attractive and useful articles shown here were made from GEON polyvinyl materials. Such products may be brilliantly or delicately colored—clear or opaque—flexible or rigid.

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Shown in the illustration are the following products: fly swatter, raincoat, tablecloth, shower and window curtains, press polished sheet, blanket bag, floor tiles, garden hose, dog leashes, lady's belt, lady's handbag, clothesline and wire insulation.

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to prevent scorching, and for recovering
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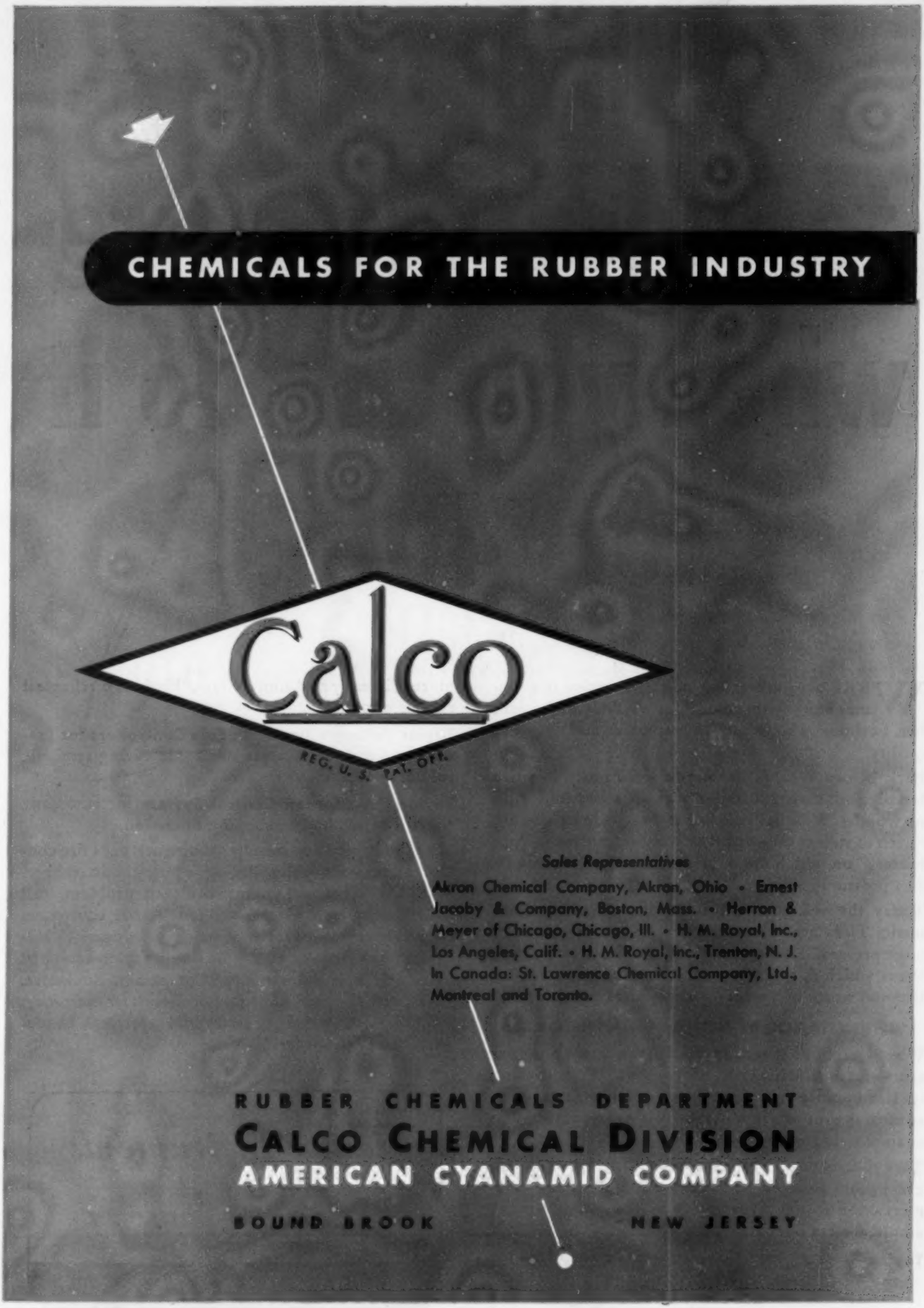
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WE'RE not joking! Behind this question is a success story with a moral for anybody in the rubber business who wants to cut costs and improve quality.

Back before World War I you were lucky if a tire lasted more than 200 miles without a blowout. And no wonder. With tire building technique in its infancy, fifteen to twenty tires at a time were vulcanized in "pot heaters" on which the only control instrument was a $15 pressure gauge.

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WE KNOW YOU'RE NOT A PHILANTHROPIST

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This applies not only to tire vulcanizing but to almost every other process in the rubber industry from polymerization to the manufacture of golf balls. For example, we can offer you:

Taylor Platen Press Control System adaptable for more efficiently molding different kinds of mechanical rubber goods.

Taylor Fulscope Time Schedule Controllers for precise time and temperature control in curing synthetic rubber goods.

Taylor Coordinated Control System for automatic control of any batch stripping operation.

We even helped one manufacturer work out a fire control system for safer drying of synthetic rubber. MORAL: Whatever your processing problem, call your Taylor Field Engineer. Or tell your equipment manufacturer you want your new platen press or vulcanizer or whatever you're buying "Taylor-equipped as usual!" Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.*

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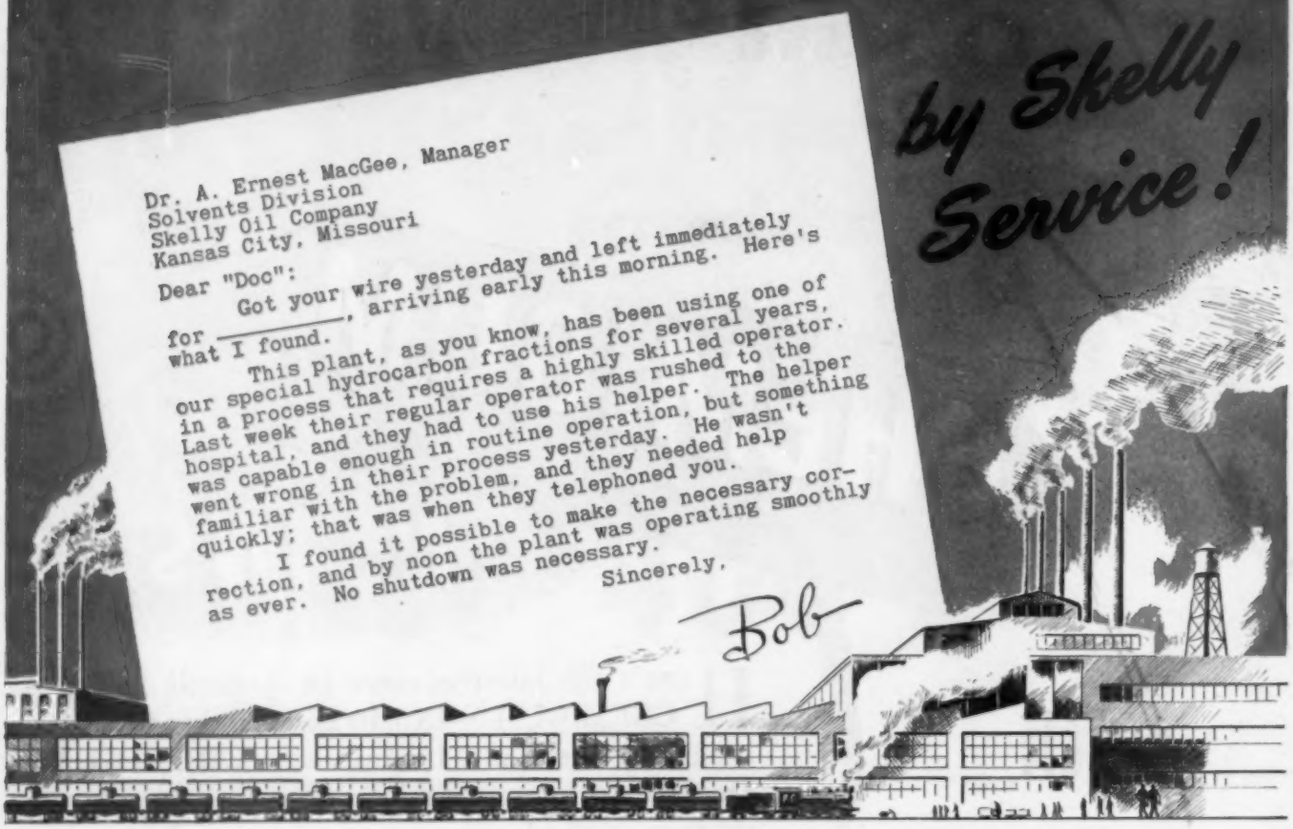
Dr. A. Ernest MacGee, Manager
Solvents Division
Skelly Oil Company
Kansas City, Missouri
Dear "Doc":
Got your wire yesterday and left immediately for _____, arriving early this morning. Here's what I found.
This plant, as you know, has been using one of our special hydrocarbon fractions for several years, in a process that requires a highly skilled operator. Last week their regular operator was rushed to the hospital, and they had to use his helper. The helper was capable enough in routine operation, but something went wrong in their process yesterday. He wasn't familiar with the problem, and they needed help quickly; that was when they telephoned you.
I found it possible to make the necessary correction, and by noon the plant was operating smoothly as ever. No shutdown was necessary.
Sincerely,
Bob

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Sooner or later, every user realizes the importance of another factor — *ability of the supplier to render special service in emergencies!* When that occasion arises, the quick and effective action Skelly is famous for may mean a great deal to you. The emergency may call for rushing you a tank truck or drum shipment of solvent from our Chicago bulk plant to cover a sudden shortage. It may entail double-rushing a shipment or diverting a tank car in transit; or, it may require sending out a specially trained man to help correct a stubborn problem.

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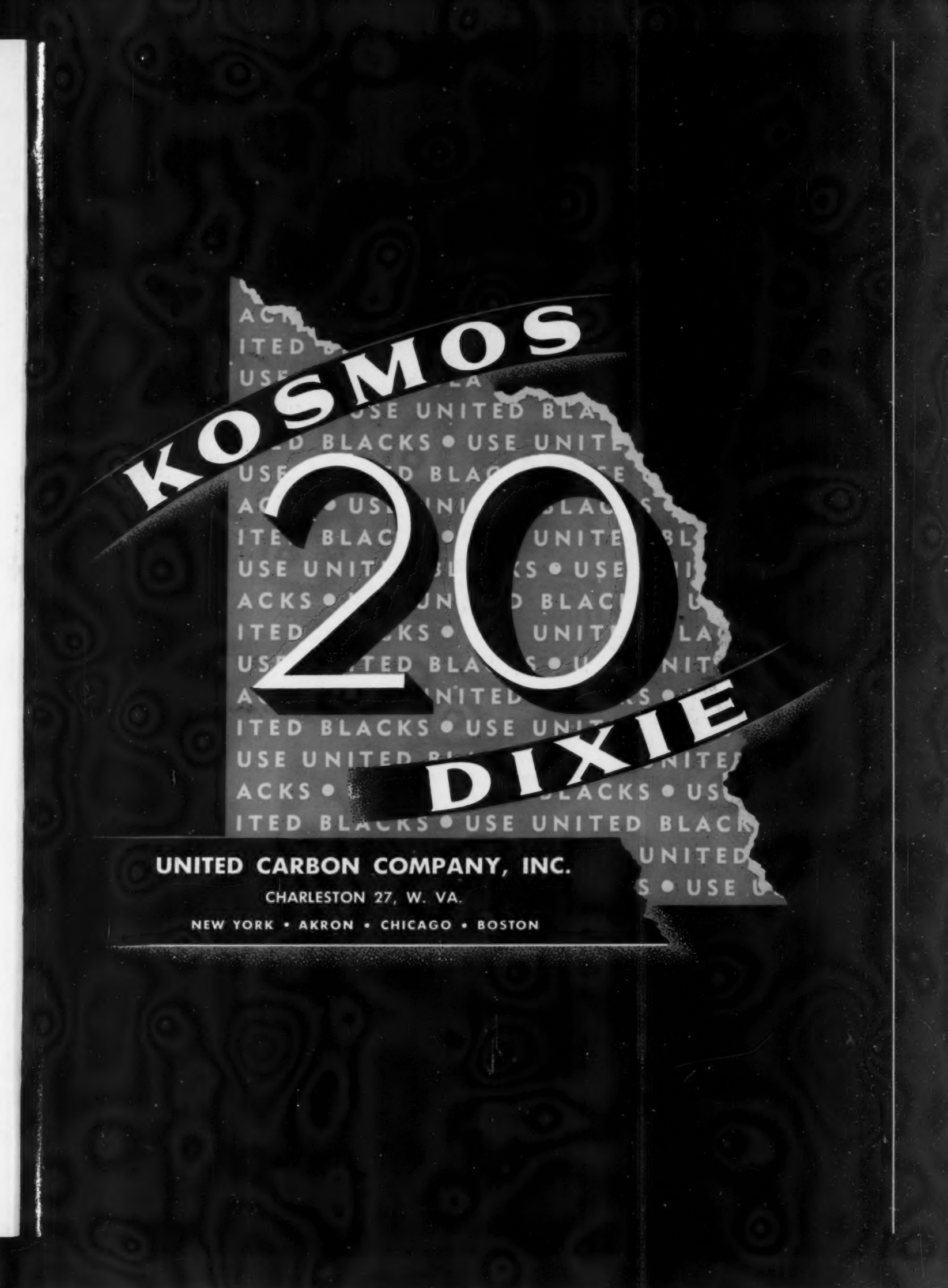
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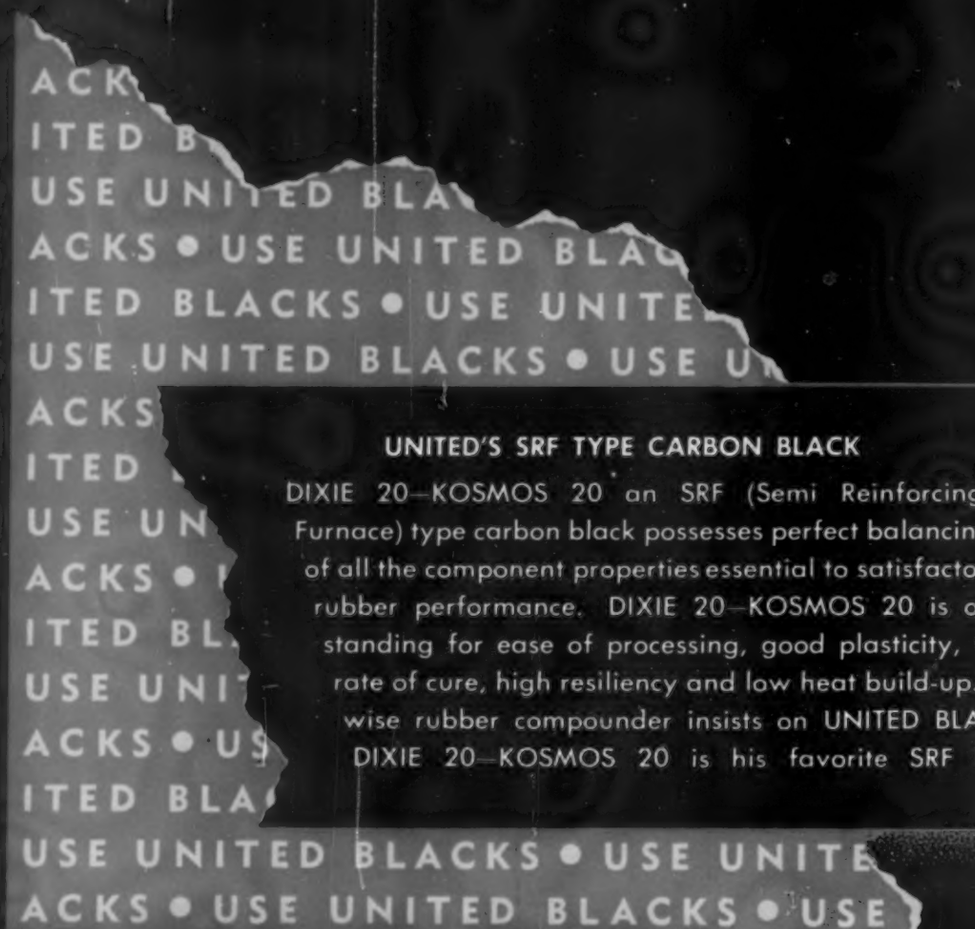

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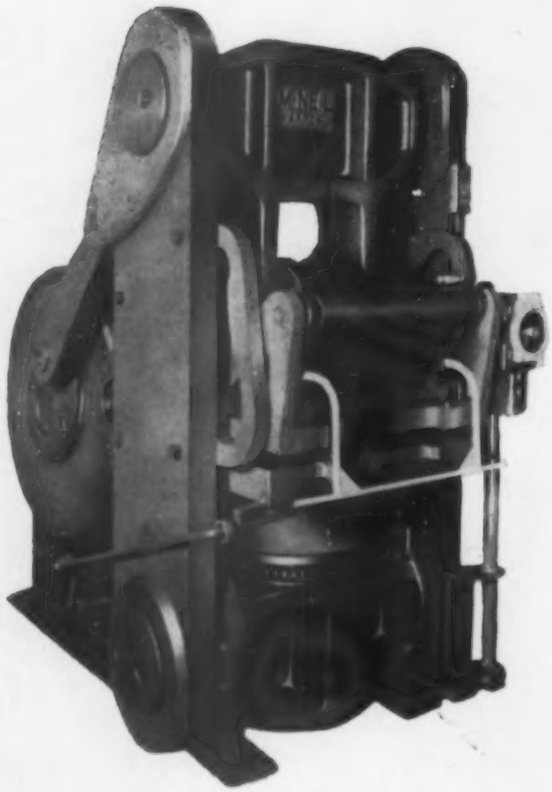
The first of a new line of platen presses



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780 POUNDS PER SQUARE INCH PLATEN PRESSURE.

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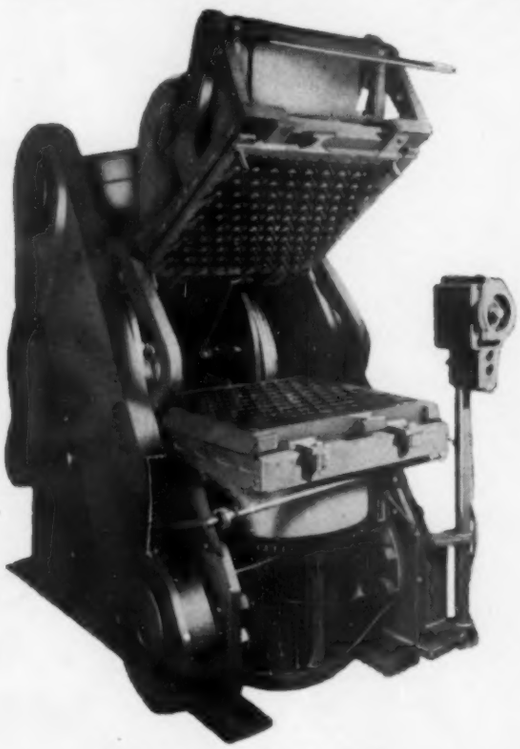

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Vinyl Butyral	C-L	C	C-L	I	C	I	C
Vinyl Chloride	C	C	C	C	C	I	C
Vinyl Chloride-Acetate	C	C	C	C	C	I	C
Cellulose Acetate	I	I	I	I	SI	I	I
Cellulose Acetate-Butyrate	C	C	C	SI	SI	I	—
Cellulose Nitrate	C	C	C	C	C	C	C
Ethyl Cellulose	C	C	C	C	C	I	C
Synthetic Rubbers	C	C	C	C	C	I	C

C—Compatible I—Incompatible S—Slightly L—Plasticizer sweats out

A booklet on the general function of plasticizers and the specific uses of "FLEXOL" PLASTICIZERS, Form-5882, may be of help in your application. Phone or write our nearest office for this booklet or for samples and prices.

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LET'S LOOK INTO A 3A BANBURY'S PROCESSING ABILITY

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Special design and construction adapt this machine admirably to the processing of a wide variety of synthetics and plastics. Intensive Banbury rotor action mixes the most resistant materials thoroughly, and controls are provided to simplify correct operation and assure consistent, high quality production.

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A telechron timing device fitted with instruction charts, signals the operator as each step of the mixing cycle is completed.

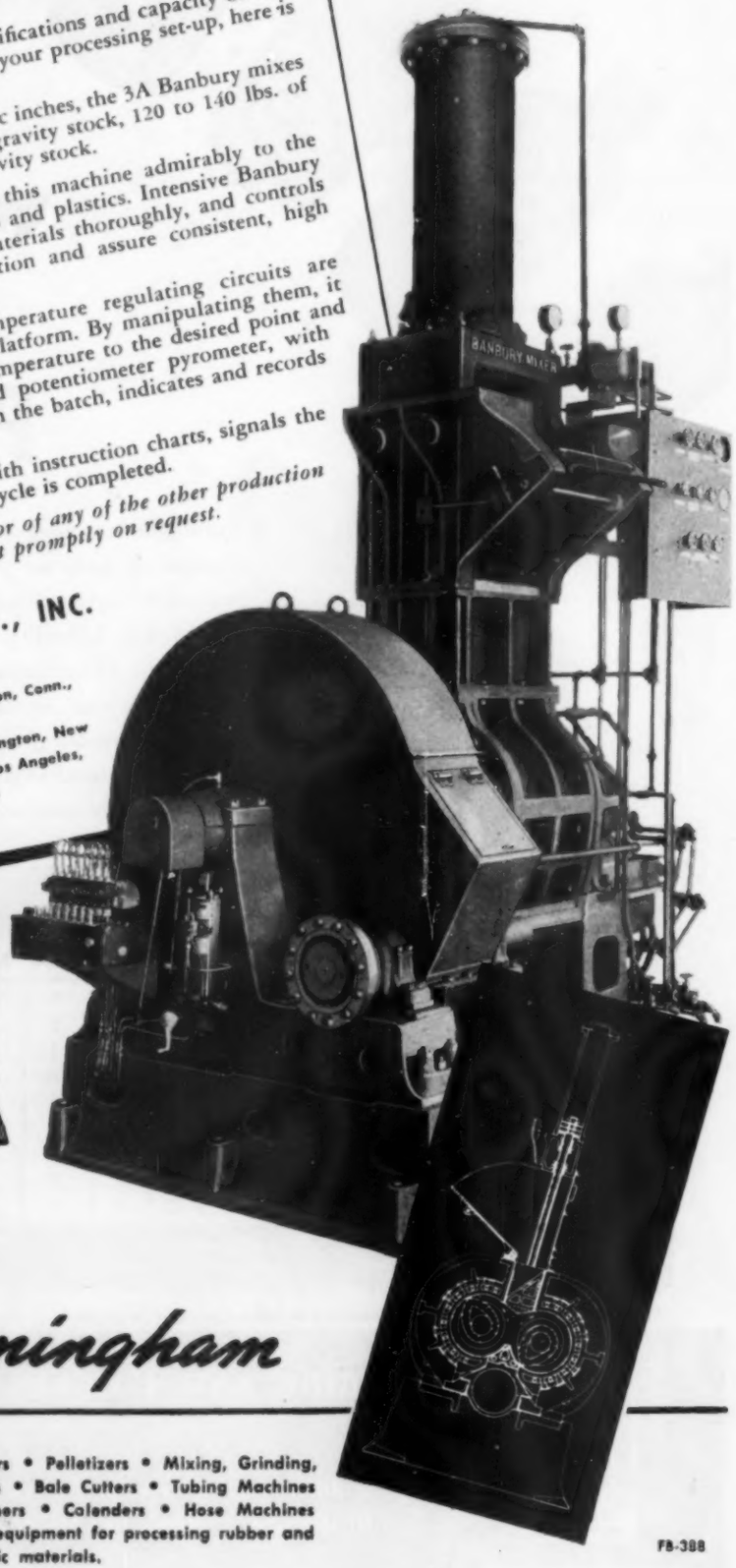
Complete details of this machine or of any of the other production units listed on this page will be sent promptly on request.

FARREL-BIRMINGHAM CO., INC.

ANSONIA, CONN.

Plants: Ansonia, Derby and Stonington, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, Stonington, New York, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston, Charlotte



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FB-388

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Plasticizers
Antioxidants

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Wherever petroleum solvents are used, Picco HiSolv offers many advantages. These fully-refined aromatic petroleum solvents are available in a wide range of distillation grades—with boiling points from 100°C to 350°C. HiSolv provides maximum solvent power per dollar invested. Other desirable characteristics include: water-white color, good odor, no unstable unsaturates.

In the manufacture of Picco HiSolv, broad experience in the field of coal tar products has been employed. It is made in large volume, and is *available now*. Write for data and samples. Specify boiling range desired.

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Distributors to the Rubber Industry, STANDARD CHEMICAL COMPANY • Akron, Ohio

Rubber
RED BOOK
Directory of the Rubber Industry

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Such wide acceptance of the RUBBER RED BOOK by suppliers to the rubber industry is a sure recognition of the fact that this book is the most direct and economical means of reaching those men in the rubber industry who annually purchase over a Billion Dollars worth of materials and equipment—at the exact moment when they are seeking buying information!

To insure that you get your share of this tremendous volume of business, arrange NOW to be represented with ample space in the 1947 RUBBER RED BOOK scheduled for publication in July. Send in your order today!

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Plasticizer for Superior Aging of Electrical and Surgical Tapes

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Again, in belting, the unique properties of PELLETEX in the compound, add years of efficient service. No matter what type of belt, from high speed automobile fan belts to the heaviest power transmission and conveyor belts, PELLETEX, leading S R F Black, contributes that something which reduces fatigue, heat build up, and wear.

PELLETEX Belting grows old slowly.

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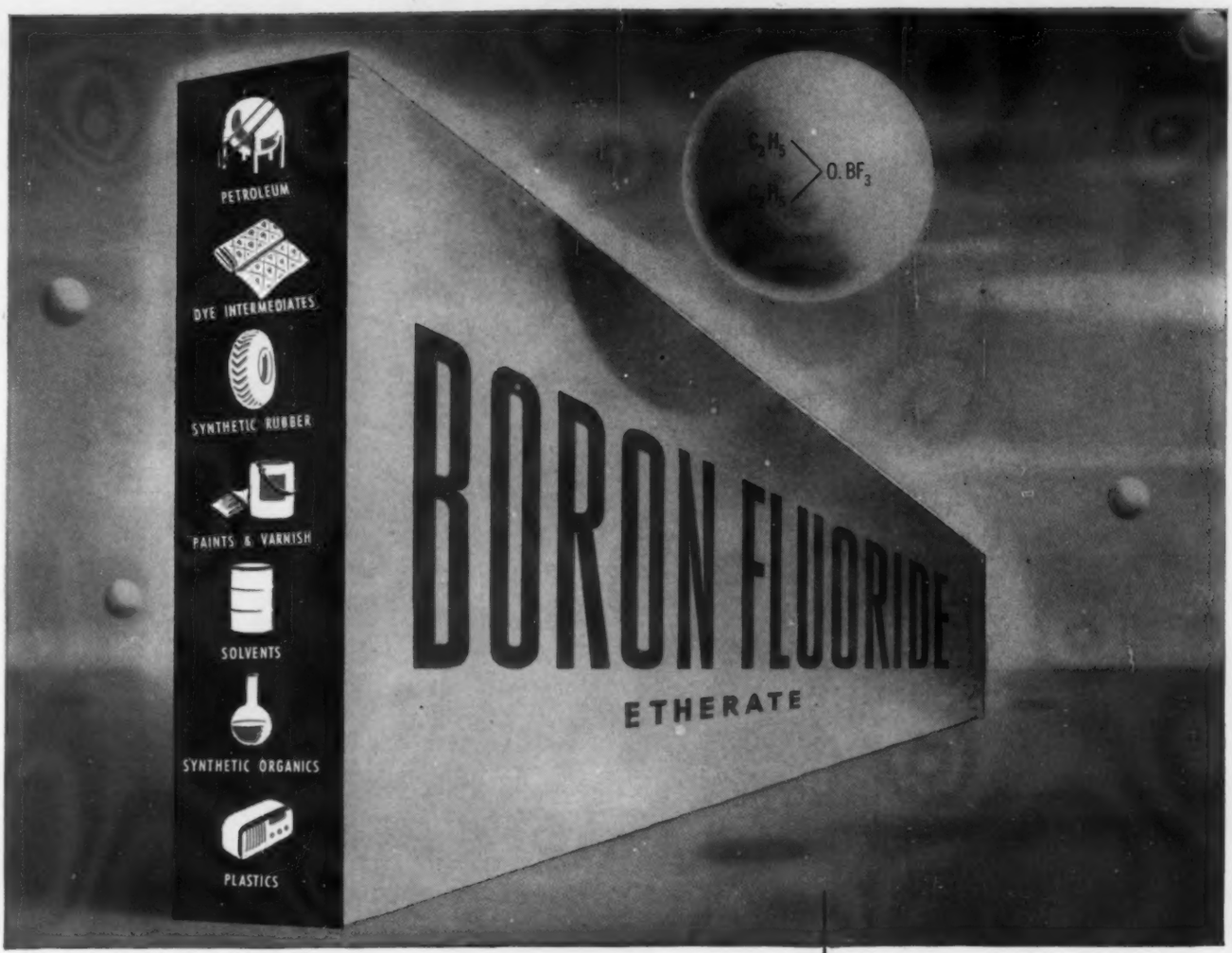

Do You need this

VERSATILE NEW CATALYST?

From petroleum to plastics ...synthetic organics to solvents, Boron Fluoride Etherate is a valuable catalytic chemical with a far-reaching range of uses.

Some of the principal reactions catalyzed by this new General Chemical Company fluorine compound are listed at the right. Others are covered in reference after reference in technical literature containing extensive data on the reactions catalyzed by BF_3 as well as by its complexes with other organic molecules. Repeatedly, mention is made of its superiority to other catalysts since reactions are moderated and fewer undesirable by-products result.

Boron Fluoride Etherate is commercially available in drums. Thus, you can investigate it for immediate application in your development or production program, confident that your needs for full scale manufacturing use can be met.

For further information, write to General Chemical Company, Fluorine Division, 40 Rector Street, New York 6, N. Y An outline of your proposed application for this new catalyst will enable our technical staff to work with you toward a solution of your problem.

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40 RECTOR STREET • NEW YORK 6, N. Y.

Sales and Technical Service Offices: Albany • Atlanta • Baltimore Birmingham • Boston • Bridgeport • Buffalo • Charlotte • Chicago Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles Minneapolis • New York • Philadelphia • Pittsburgh • Providence San Francisco • Seattle • St. Louis • Wenatchee & Yakima (Wash.)
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BASIC CHEMICALS
GENERAL CHEMICAL COMPANY
FOR AMERICAN INDUSTRY

Physical Properties

Formula:

C_2H_5 > O.BF_3
C_2H_5

Molecular Weight: 141.9
Melting Point: Less than −60°C
Boiling Point: 125°C
Specific Gravity: 1.14 at 25°C
%BF_3: 47.8% min.

Some of the Principal Reactions Catalyzed by BF_3

1. Polymerization of unsaturated compounds such as olefins, diolefins, vinyl ethers, fatty oils, and terpenes. The products may be solid polymers useful as plastics or liquids as in the bodying of drying oils for paints and varnishes.

2. Condensation of aromatic nuclei with olefins and diolefins, paraffins and olefins, and aromatic nuclei or olefins with acids.

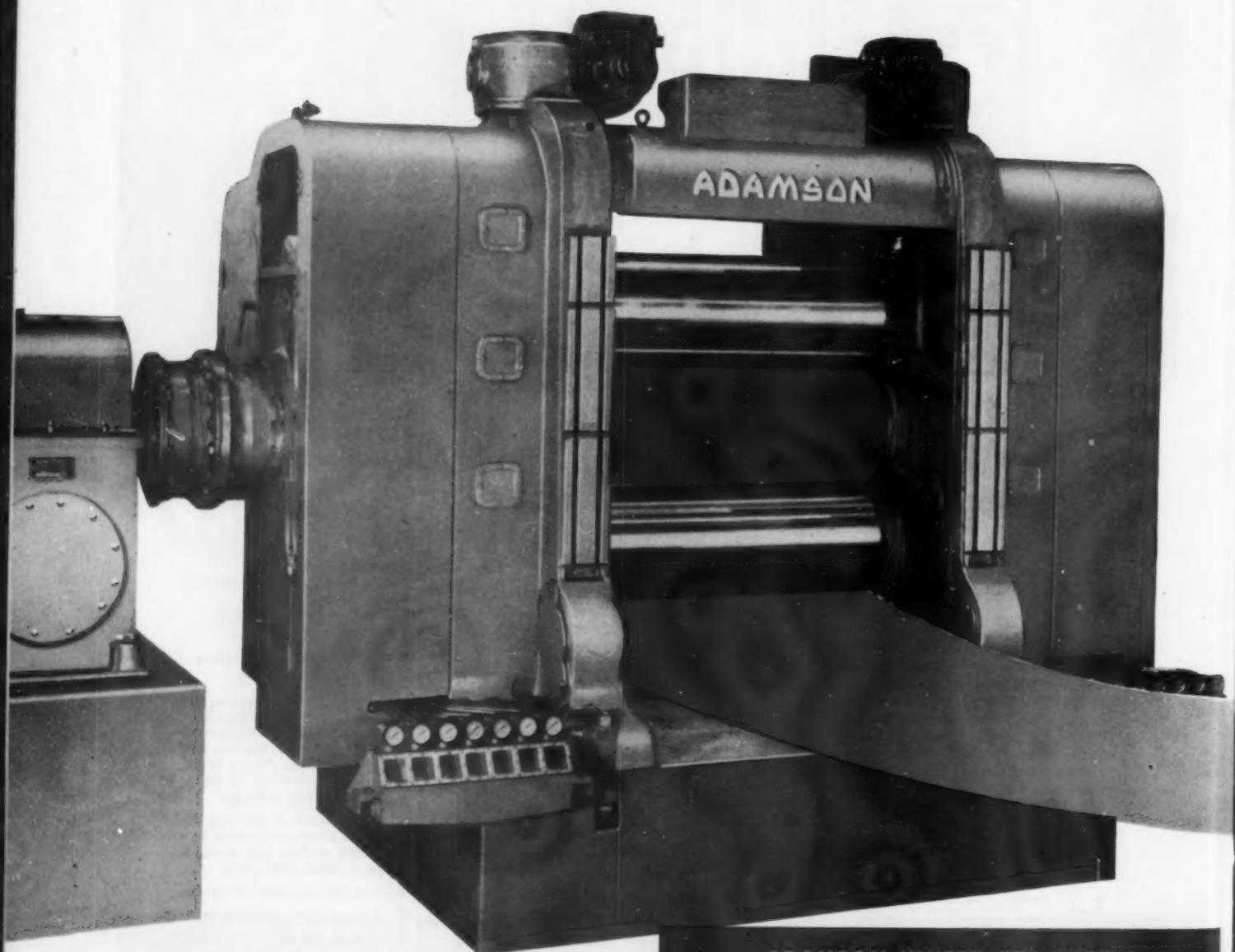
3. As a cyclizing agent for rubber.

4. As an esterification catalyst.

5. As a catalyst in the synthesis of aliphatic acids from alcohols and carbon monoxide.

6. As a promoter and dehydrating agent in the sulfonation and nitration of aromatic compounds.

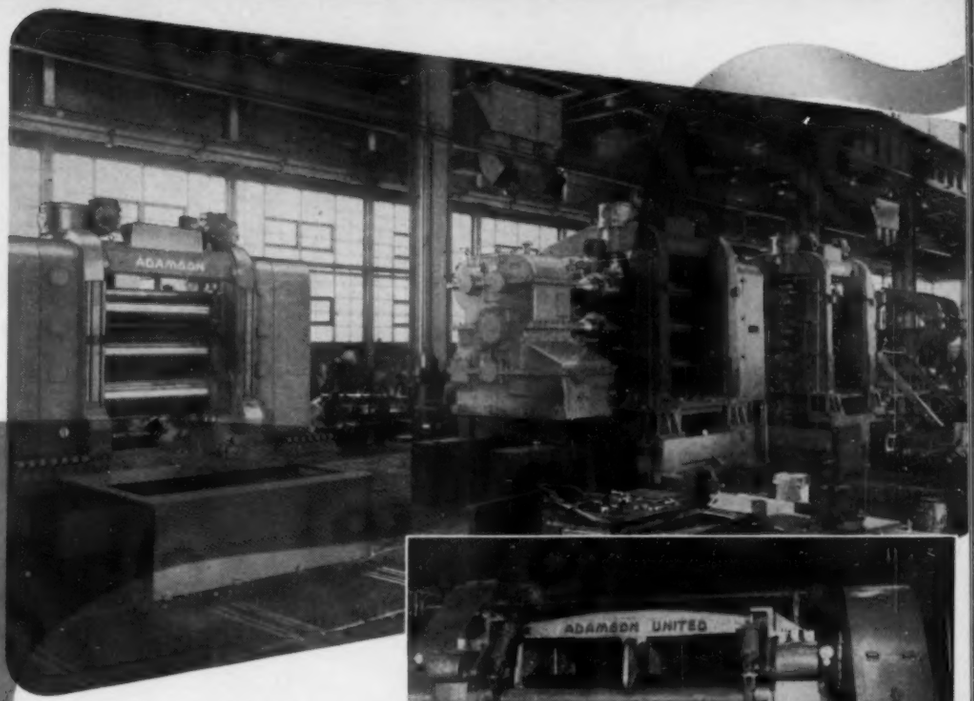
new Adamson Calenders



24" x 68" Standard 4-Roll Calender with flood lubricated roll bearings; even and friction connection gears, and Cone Worm Drive direct connected to middle roll.

ADAMSON UNITED PRODUCTS FOR THE PLASTICS INDUSTRY

- [illegible] for plastic film or [illegible] abrasive mat sizes
- [illegible] for calendered film
- Wind-up for calendered film
- [illegible] for rigid plastic sheet
- [illegible] or Sponge Compounds
- [illegible] plastic coated fabrics
- [illegible] calendered fabrics
- Embossing Calenders
- Mixing [illegible] all sizes up to 24" x 84"
- Auto-Lifts with quick opening doors
- Plywood Presses
- For the hydraulic presses, platens and [illegible]



Calender Assembly Floor, New Castle Plant.
24" x 68" Std. 4-Roll Calender in foreground . . . three Precision Type 4-Roll Calenders in background.

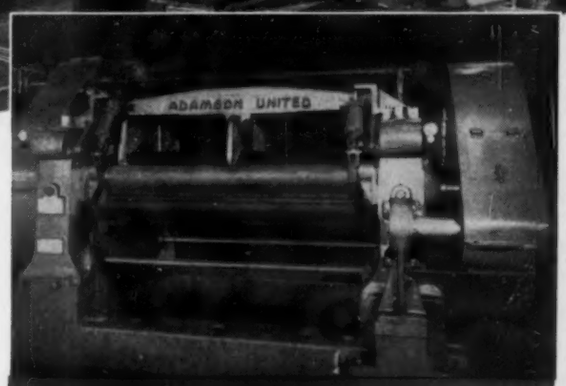
For sheeting unsupported Plastic Film

These entirely new Calenders produce film of varying thicknesses ranging from extremely low gauges up to rigid sheets. They permit higher and more uniform roll temperatures so that wider sheets can be calendered. Uniform gauges across width of sheet are maintained with no change in roll crown.

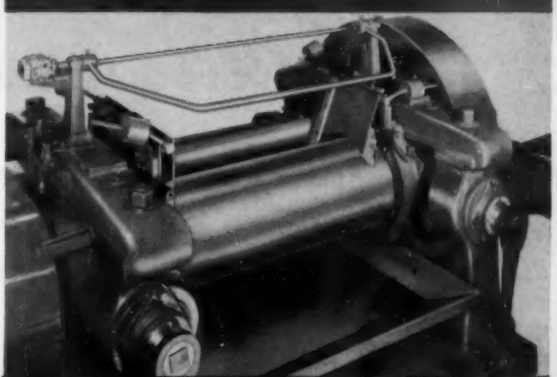
THE NEW 24" x 68" STANDARD 4-ROLL CALENDER

This modern unit is ideally suited for the manufacture of standard types of unsupported film and for the coating of fabrics. It is capable of producing the finest quality product at high production speeds. Some outstanding features are:

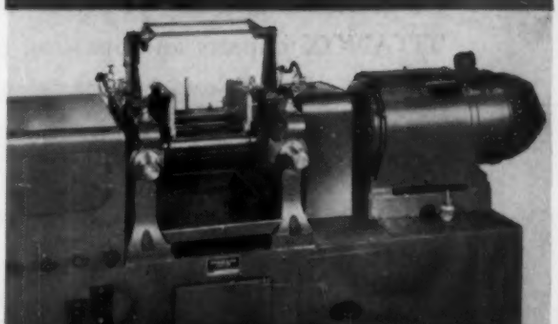
- **High capacity drive direct-connected to center roll.**
- **Pre-loaded roll bearings.**
- **No-leak oil seals.**
- **Temperature control of bearing lubricant.**
- **Precision roll adjustment.**
- **Pre-loaded adjusting screws.**
- **Rugged frame; oversize bearings.**
- **Compact floor arrangement.**



Modern 26" x 84" Mill equipped with self adjusting center guide and pneumatically operated roll scraper which can be moved against or away from roll by overhead foot treadle or hand valve.



New, Heavy-Duty 24" x 60" Banbury Mill for mixing and blending raw materials prior to calendering. It is equipped with oil flood lubrication . . . triple oil seals on oil bearings and tiltable, easily cleaned stock guides. Can also be furnished in 16" x 36" or 20" x 48" sizes.



Our "Model 6" x 12" self-contained Lab. Mill incorporating many features wanted by research laboratories. Furnished on cabinet with all controls mounted on front cabinet panel. Has flood lubricated bearings, triple oil seals . . . tiltable stock guides. Can also supply 8" x 13" or 12" x 24" sizes.

We design and supply entire calendering process systems including all accessory equipment. To assure our customers the earliest possible delivery of precision-built plastics processing equipment, we have combined the facilities of six great plants, each operated by personnel with years of experience in the building of heavy machinery. From these plants the various components of steel and iron castings, gears, chilled iron rolls and other parts are assembled at New Castle.

Complete details on the Calenders and Mills illustrated, or on any other equipment we manufacture, will be furnished on your request.

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AKRON, OHIO

SUBSIDIARY OF UNITED ENGINEERING AND FOUNDRY COMPANY

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TITANOX ... *the brightest name in titanium pigments*

... a little goes a long way

Rubber manufacturers who use TITANOX know how economically it whitens and brightens their products. They know they're getting titanium dioxide pigments high in effectiveness for natural or synthetic stocks or for white or tinted items.

TITANOX pigments are consistently good-working, too. Their extremely fine particle size, ease of dispersion, and high refractive index make for greater brightening power. In colored rubber, TITANOX imparts an appealing clarity of tint.

Our Technical Service Department will be glad to help solve your pigmentation problems. Consult them through the nearest Titanium Pigment Corporation address.

Industry has profited by a host of basic advances in titanium pigment pioneered in research laboratories such as this one at Sayreville, New Jersey. Here highly experienced technicians experiment constantly to improve existing grades of TITANOX pigments and to develop new types.

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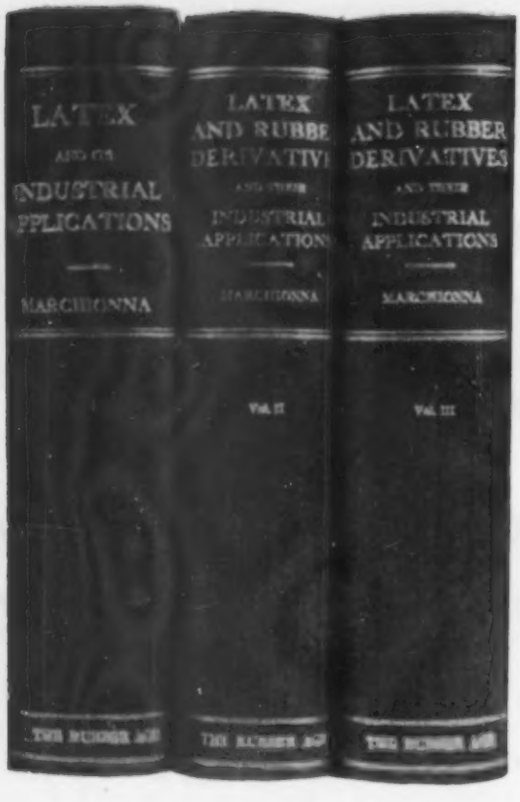

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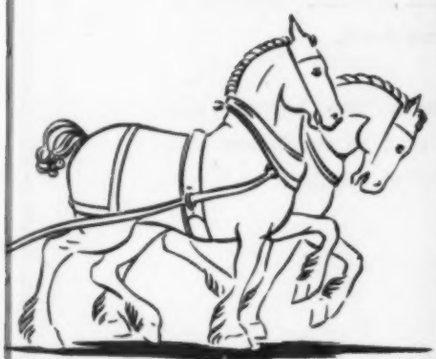

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*Semi-Reinforcing Furnace

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ATTACHMENT FOR MILLS

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Cooler stocks will permit the addition of accelerators without scorching.

Eliminate the human element and increase the uniformity of batches.

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Eliminate the tiresome labor of hand blending and warm-up. One operator can sometimes operate two or three mills.

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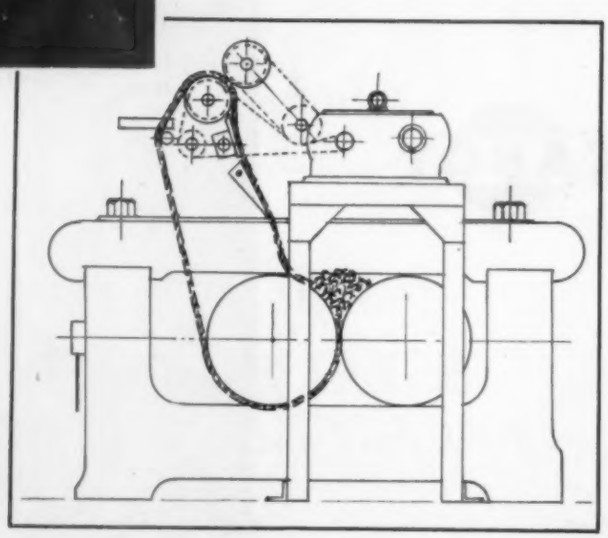
The ultimate in dispersion is quickly obtained.
Plasticity speed increased with less heat.



The Akron Standard Mold Co.
Akron — *The Established Measure of Value* — Ohio

ANY COLOR IN ANY SHADE! . . . *that's just one of the features of this amazing Perbunan 26 NS!* As you read these other Perbunan 26 NS features, think of them in terms of product quality and profit!

- *Color stability of compounds subjected to sunlight, ultra-violet radiation, heat.*
- *Adaptability to delicate colors, including pastels.*
- *Non-staining of porcelain, enamels, plastics or fabrics.*
- *Compatibility with polyvinyl chloride in solutions, films, extrusions or molded items, whether clear or colored.*
- *Compatibility with modified phenolic type resins.*

. . . All this in addition to Perbunan's famous oil resistance, low temperature flexibility, heat aging characteristics and serviceability! There's much more we'd like to tell you about every one of these new features . . . much more you'll want to know. Write for more information, and let us help with your compounding problems.

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

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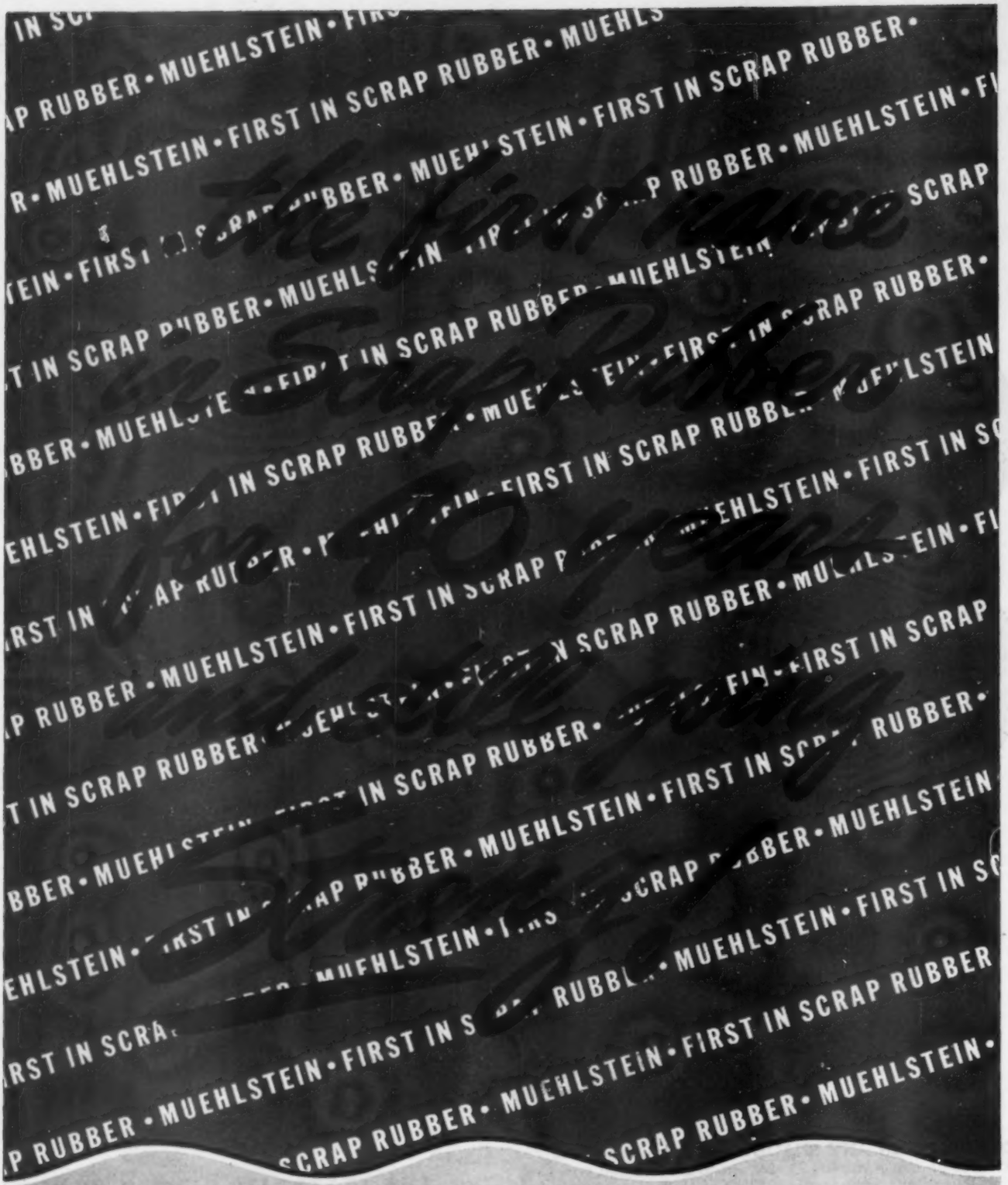

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A typical instance: in coaxial cable produced by Federal Telephone & Radio Corporation, PARAPLEX G-25 is used because this resinous plasticizer is non-migrating. This property prevents contamination of the insulation, which would affect the properties of these highly specialized cables.

Other advantages of PARAPLEX G-25 are excellent ultra-violet resistance, high temperature stability, low flammability and ease of processing, particularly on stocks, both extruded and calendered, where a high finish is desired.

If you are working with vinyl compounds, you'll want to know more about PARAPLEX G-25 . . . and about the MONOPLEX group of ester plasticizers.

Complete information will be sent to you upon request.

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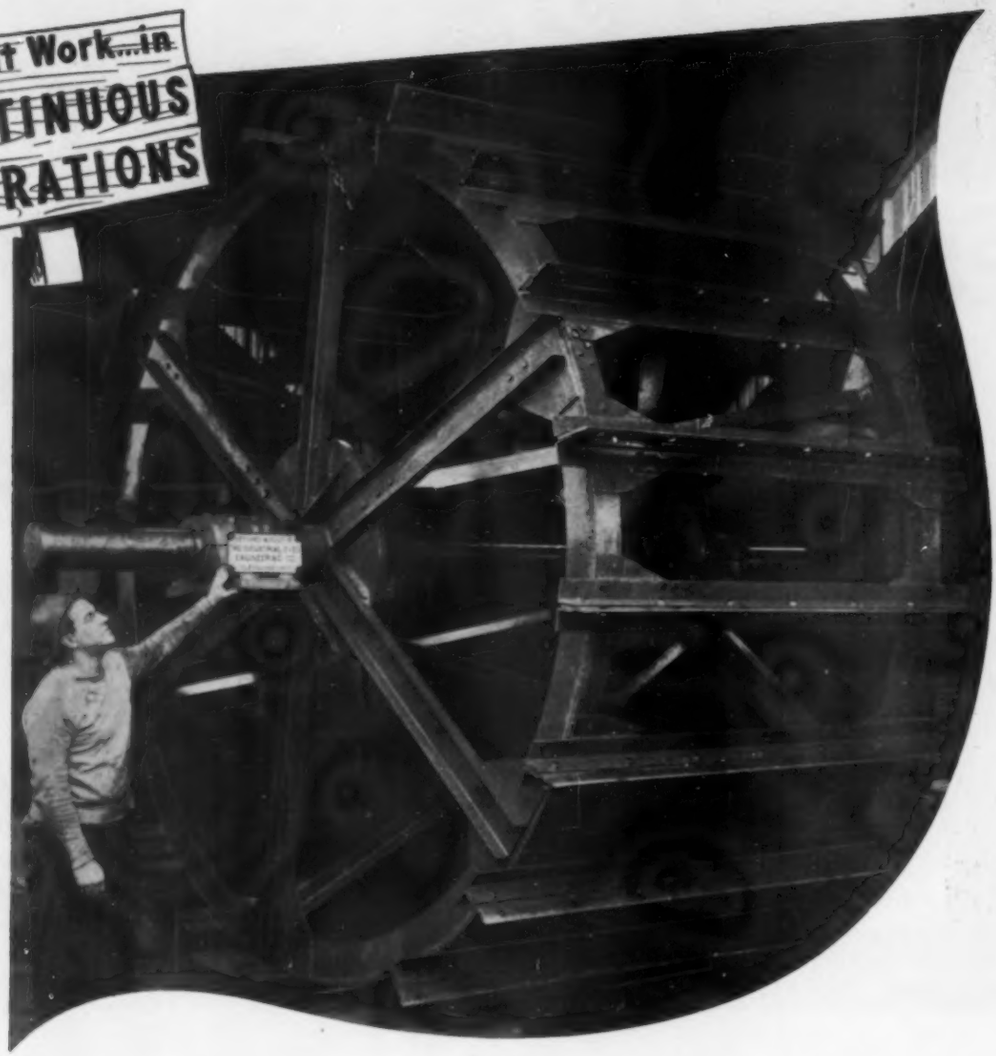

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A playground ride like this is serious business in the textile industry. Speedy finished processing of coated and calendered fabric is a real problem . . . fabric must be handled with particular care, drying speeds matched exactly with top handling speeds. It's a job for specialists in the use of heat in continuous operations . . . so the problem was turned over to IOI.

Result: IOI engineers designed a complete system—including dip tanks and excess material removal units—with its chief feature the mammoth dryer wheel shown above. A three-ton giant with a baby's touch, it is so delicately balanced and is so closely controlled—electronically—that the finest and thinnest materials ride over it without danger of marking or breakage . . . at unprecedented speeds.

This system is typical of IOI's engineering versatility in applying its sound basic principle to the industrial processing of monofilament and web materials . . . *putting heat to work in continuous operations.*

Complete details of IOI installations adaptable to your industry are available in booklet form. Copies will be sent upon request.

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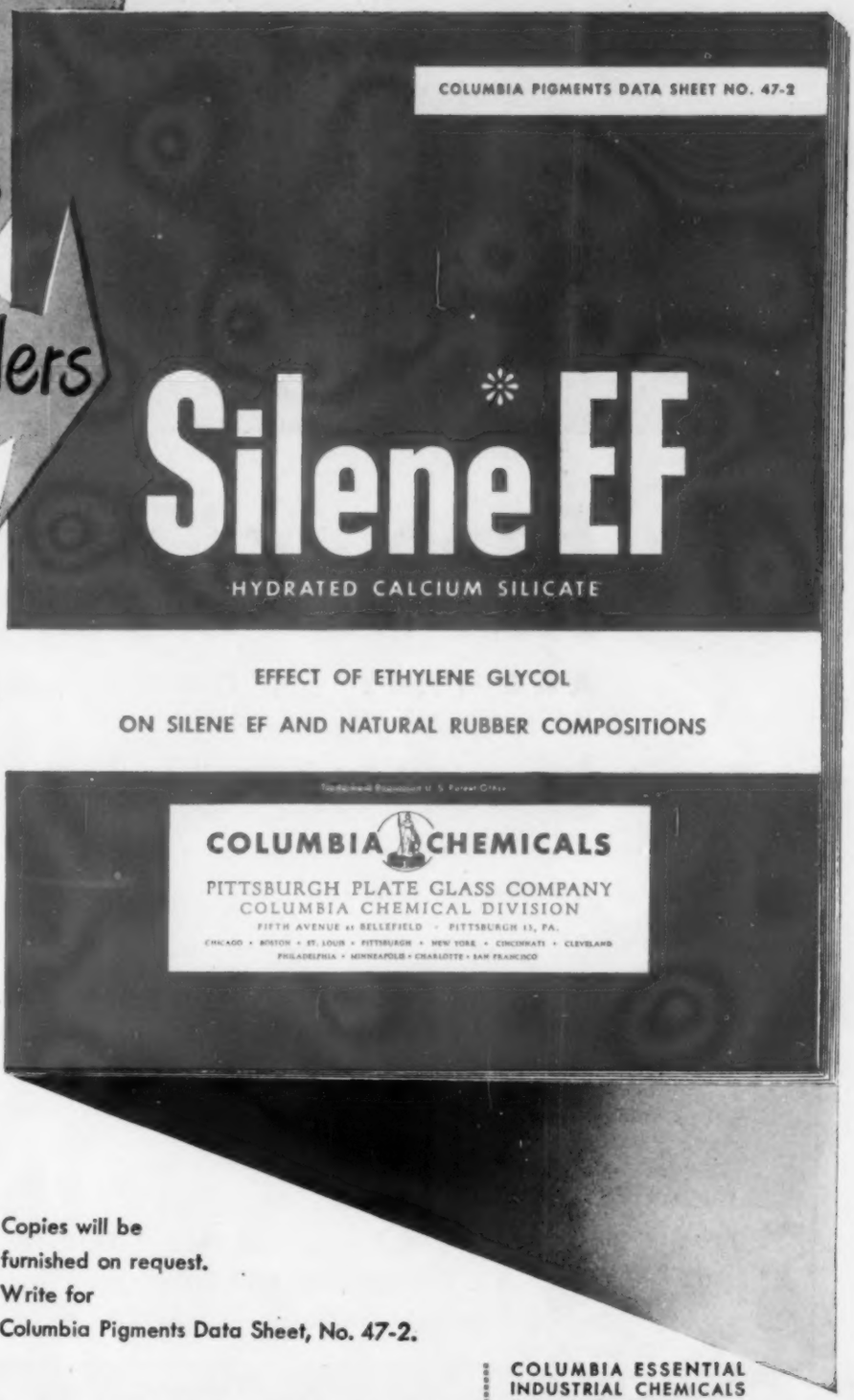
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This No. 9 rebuilt Banbury ready for crating and shipment to Rubber Plant in France. A similar machine also went recently to Argentina.

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Banbury Bodies, No. 9, completely rebuilt and hard-surfaced. Exchange for your worn Banbury — save extra time.

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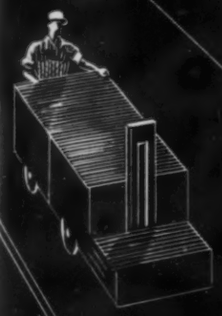
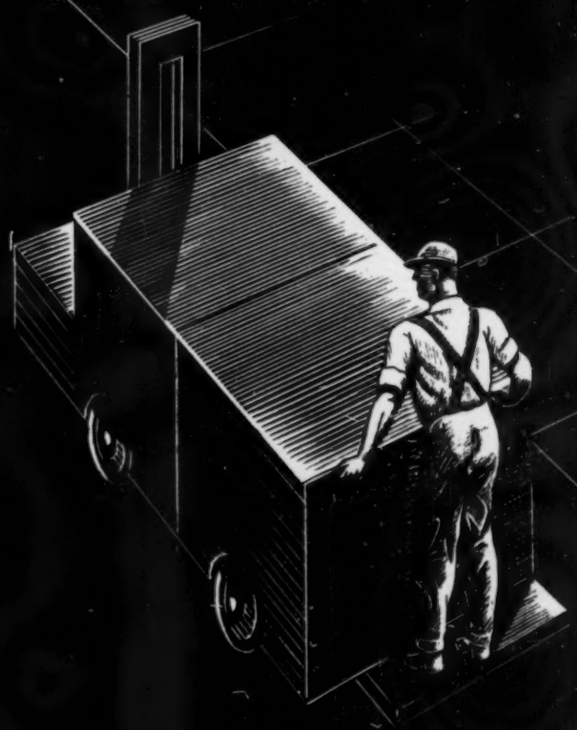


RIGHT WHERE THERE'S WEAR

In Witco Carbon Blacks extra *care* has been taken to develop extra *wear* properties. That's why rubber flooring and other natural and synthetic rubber products made with Witco Carbon Black are *right* where there's wear . . . offering high abrasion resistance and resilience. Complete technical data and product listings are yours for the asking in the Witco Carbon Black Manual, Catalog and Technical Bulletins.

WITCO CARBON BLACKS



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Continental Carbon Blacks, A and AA, are, respectively, *especially engineered* Medium Processing and Easy Processing reinforcing Channels — for use in such applications as wire and cable jackets and covers, natural and synthetic tire treads, solid tires, mechanical goods, belting.

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CONTINENTAL AA . . . an easy processing channel black . . . provides good resistance to heat generation and flex cracking . . . in addition to its advantageous processing characteristics.

CONTINENTAL A . . . a medium processing channel black . . . imparting to natural or synthetic rubbers excellent reinforcement together with high wear resistance.

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CONTINEX HMF (furnace black) . . . combines higher modulus and better wear resistance than SRF with superior resilience and resistance to heat build-up and flex cracking.

CONTINEX SRF (furnace black) . . . permits high loadings yet produces softer stocks. Achieves high resilience and resistance to heat generation.

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★ Would it be Pine Tar as a Softener for Rubber?

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That problem of finding a suitable softener for rubber may well be answered with RESINEX L-4. . . . In these times of shortages of softeners formerly used, RESINEX L-4 is being used in an increasing number of plants with results comparable with the best of the old-line rubber softeners. . . . There is an abundant supply of RESINEX L-4—and it is quite economical in cost, too. . . . We have a laboratory bulletin showing comparative results between Pine Tar and RESINEX L-4. It contains information that may be surprisingly important to you. Write for a copy.

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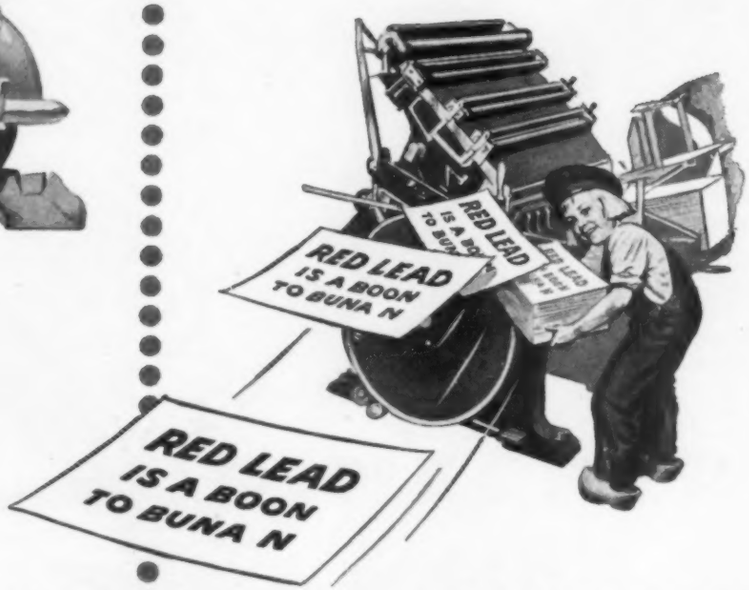

Dutch Boy: "Yes Sir . . . Red Lead is a boon to buna N products."

Plant Chemist: "But just what does it do?"

Dutch Boy: "Briefly, it gives you definitely improved properties at lower cost."

Plant Chemist: "Can you back up that statement?"

Dutch Boy: "Absolutely! Exhaustive tests, fully confirmed by the experience of users, prove beyond any question, that compounding buna N with #2 RM Red Lead gives the five, very real advantages we've listed at the right."

Plant Chemist: "Very interesting! Where can I get further information?"

Dutch Boy: "Just let us know your specific application and our technical staff will gladly supply literature and any other information you need. Drop a line to the Rubber Division of our Research Laboratories, 105 York Street, Brooklyn 1, New York."

Plant Chemist: "One more question. Is buna N the *only* rubber Red Lead improves?"

Dutch Boy: "By no means. Red Lead improves most rubber products, no matter whether your base is GR-S, GR-S-10, GR-M or GR-I. Just remember, if it's made with rubber it's better made with Red Lead."

CHECK THESE 5 REASONS FOR COMPOUNDING BUNA N WITH #2 RM RUBBER RED LEAD

1. *Greatly Improved Heat Stability*
   - *a) Retention of modulus*
   - *b) Retention of elongation*
   - *c) Retention of hardness*
2. *Decreased Cost*
3. *Improved Water Resistance*
4. *Excellent General Physical Properties*
5. *Safe Processing*

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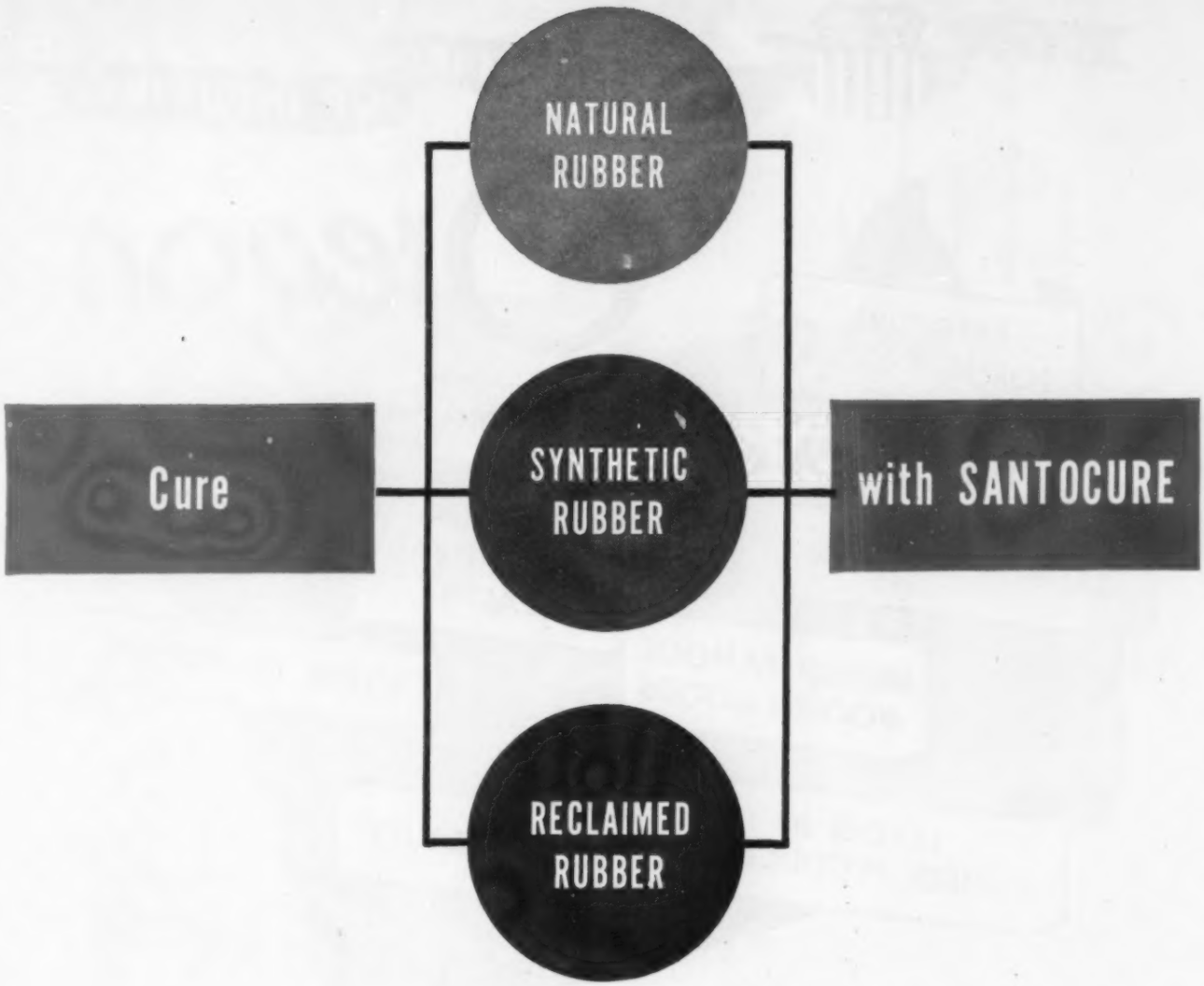

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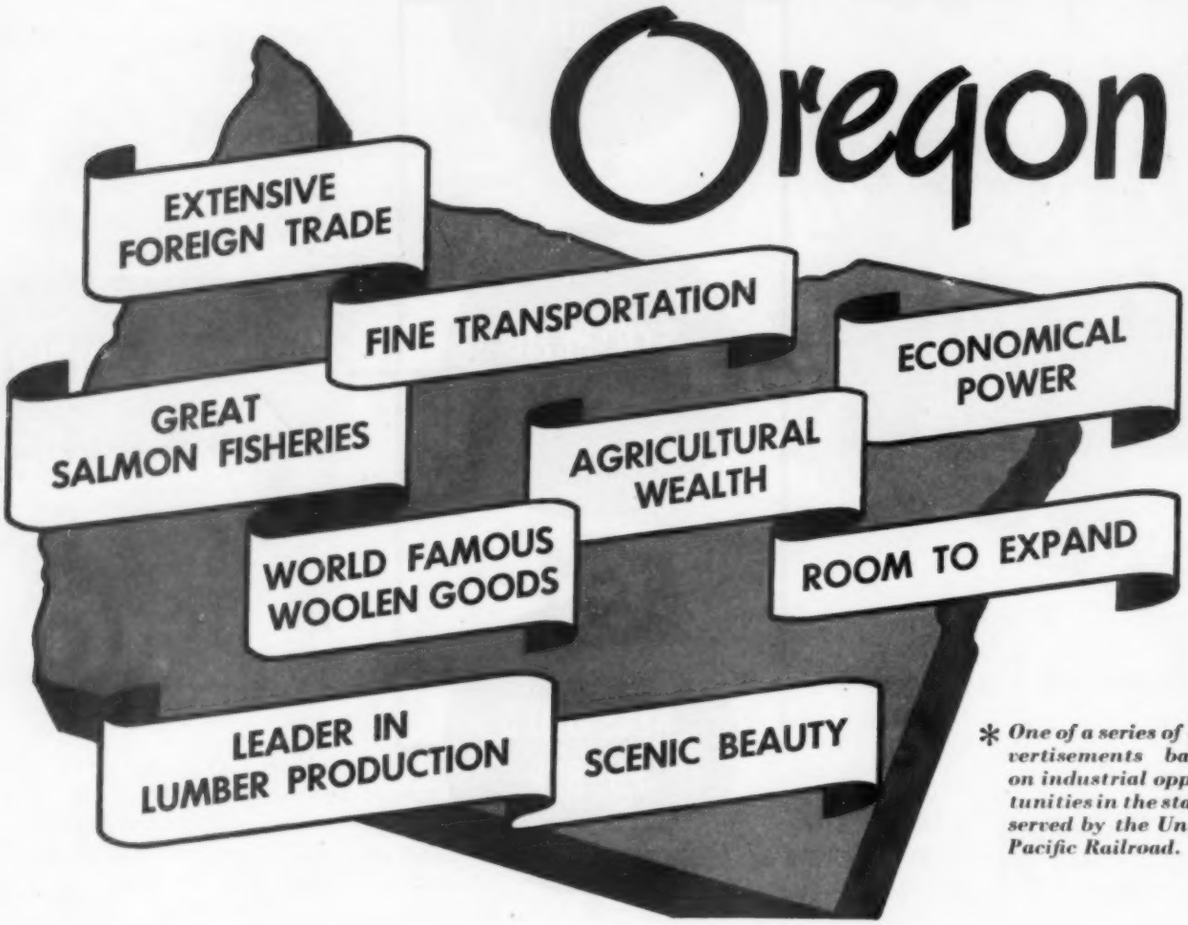

* *One of a series of advertisements based on industrial opportunities in the states served by the Union Pacific Railroad.*

When the Beaver State presents its business card, it could justifiably read, "Enterprise, Unlimited." Industry re-discovered Oregon during the war. It found boundless opportunities capable of providing a livelihood for 10 times the state's present population.

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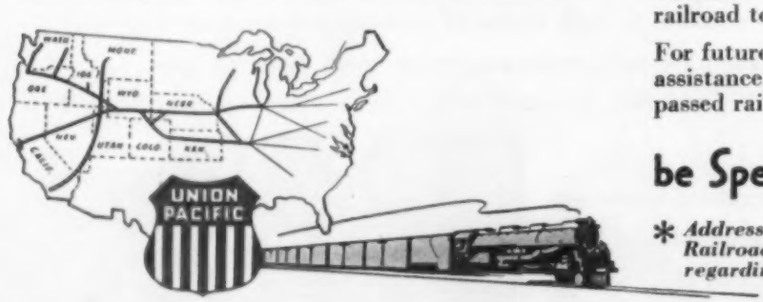

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* *Address Industrial Department, Union Pacific Railroad, Omaha 2, Nebraska, for information regarding industrial sites.*

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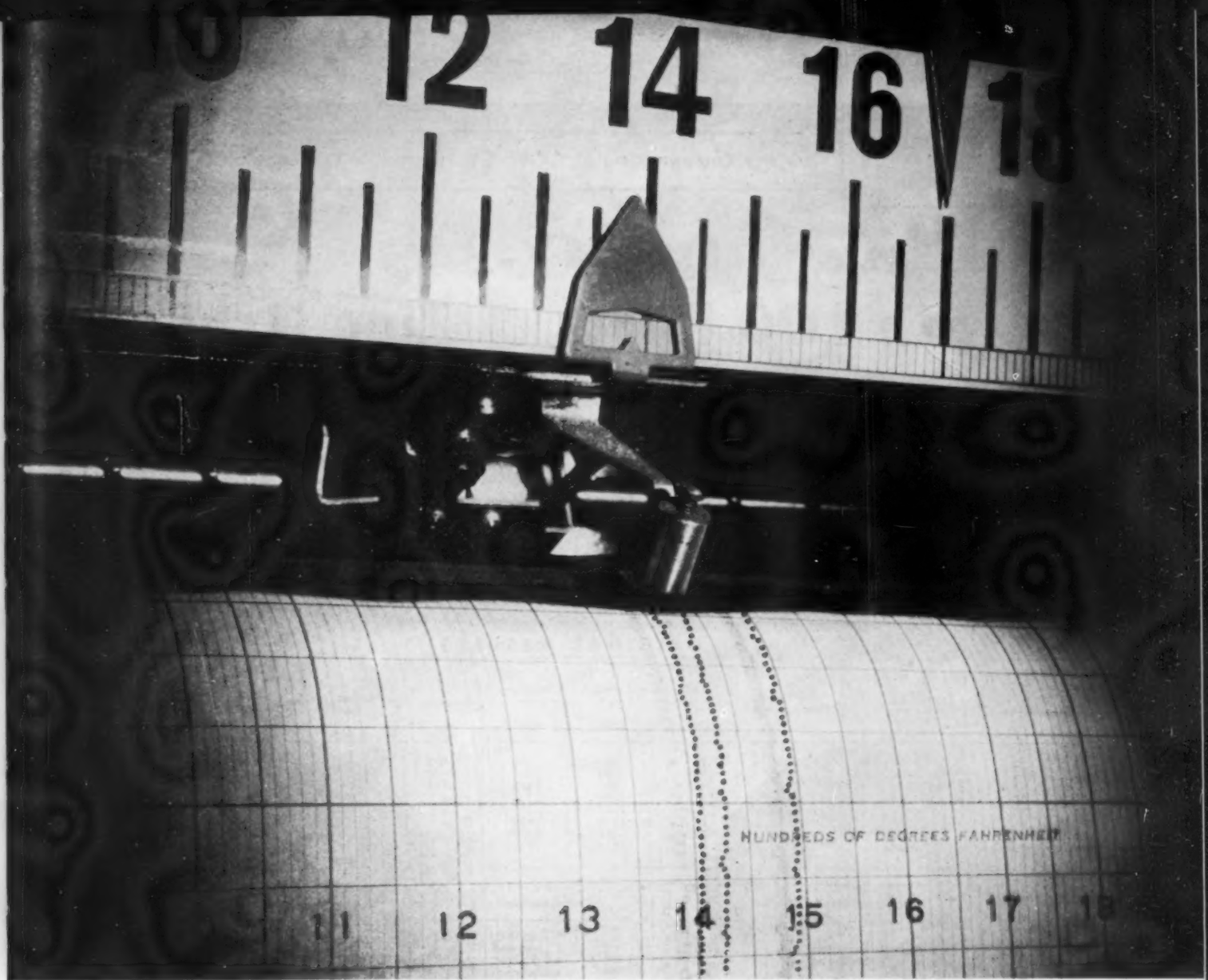

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Technical Bulletin No. 31 — on the Compounding of GR-S with Substantial Loadings of ZINC OXIDE

GR-S—X-349 with 100 Parts of Zinc Oxide

X-349 is defined by *Office of Rubber Reserve* as follows: "*A copolymer made with a limited amount of Dixie modifier fed increment wise. Because of its high Mooney, heat softening is required to obtain satisfactory processing; polymerization temperature and conversion lower than usual. Coagulated with salt and acetic acid. Similar to German Buna S-3. It is hoped that superior tread wear in tires made from this polymer will be exhibited.*"

COMPOUND NO. 31	
GR-S—X-349	100.0
Sulfur	3.25
MBT	1.25
DPG	0.15
Coumarone-indene Resin	7.5
E.L.C. Magnesia	5.0
ZINC OXIDE	100.0

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength (psi)	Per Cent Elongation	Modulus Load (psi) for Elongation of:				Permanent Set	Shore Hardness	Tear Resistance Tested at:	
			200%	300%	400%	500%			Room Temp.	100°C.
2	1200	925	145	220	330	435	.52	45	196	77
4	2480	710	340	610	915	1300	.19	51	85	42
7.5	2170	565	420	725	1180	1715	.15	55	85	46
15	1500	390	575	1000	....	....	.10	57	79	44
30	1750	380	700	1125	....	....	.11	58	70	37
45	1960	420	615	1040	1690	....	.14	59	70	38
60	1670	405	580	1050	1630	....	.12	59	70	35
90	1980	430	620	1010	1710	....	.11	60	64	37

Time of Cure Min. at 45 Lb.	Goodyear-Healey Pendulum				Compression Fatigue (Goodrich Flexometer)*					Cut-Growth Resistance Tested at 70° C. Inches Failure
	Indentation in mm.	Per Cent Rebound	Hardness		Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression		
			Shore	Rex				Initial	Final	300 Cyc.
60	7.13	68.6	59	61	20.7	15′—3.0	26.5	9.5	12.1	.48

* Test Conditions: 143 Lb. Load. 0.175″ Stroke. 100° C. Oven Temp.

THE results with X-349 give further confirmation of the observation that better reinforcing properties with Zinc Oxide are obtained with the high Mooney polymers. (See Technical Bulletin No. 28 reporting results with X-272, now known as GR-S-16.)

The X-349 was not heat-softened prior to compounding; the polymer was given a 10 minute cold break-down, but failed to band on the mill. Hot milling followed (starting temperature 93°C.) during which time the coumarone-indene resin and sulfur were added; the stock was cooled and the Zinc Oxide and remaining compounding materials added. The Zinc Oxide apparently exerts a plasticizing action, since the stock banded satisfactorily.

The results are outstanding in comparison with Standard GR-S with respect to tensile, modulus, tear resistance and rebound. Previous experience with Buna S-3 would indicate that the advantages for X-349 would persist after heat-softening. Tests with heat-softened X-349 are now in progress and will be reported later.

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(Bulletins 13 and 13A)

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FOR VINYL COMPOUNDS
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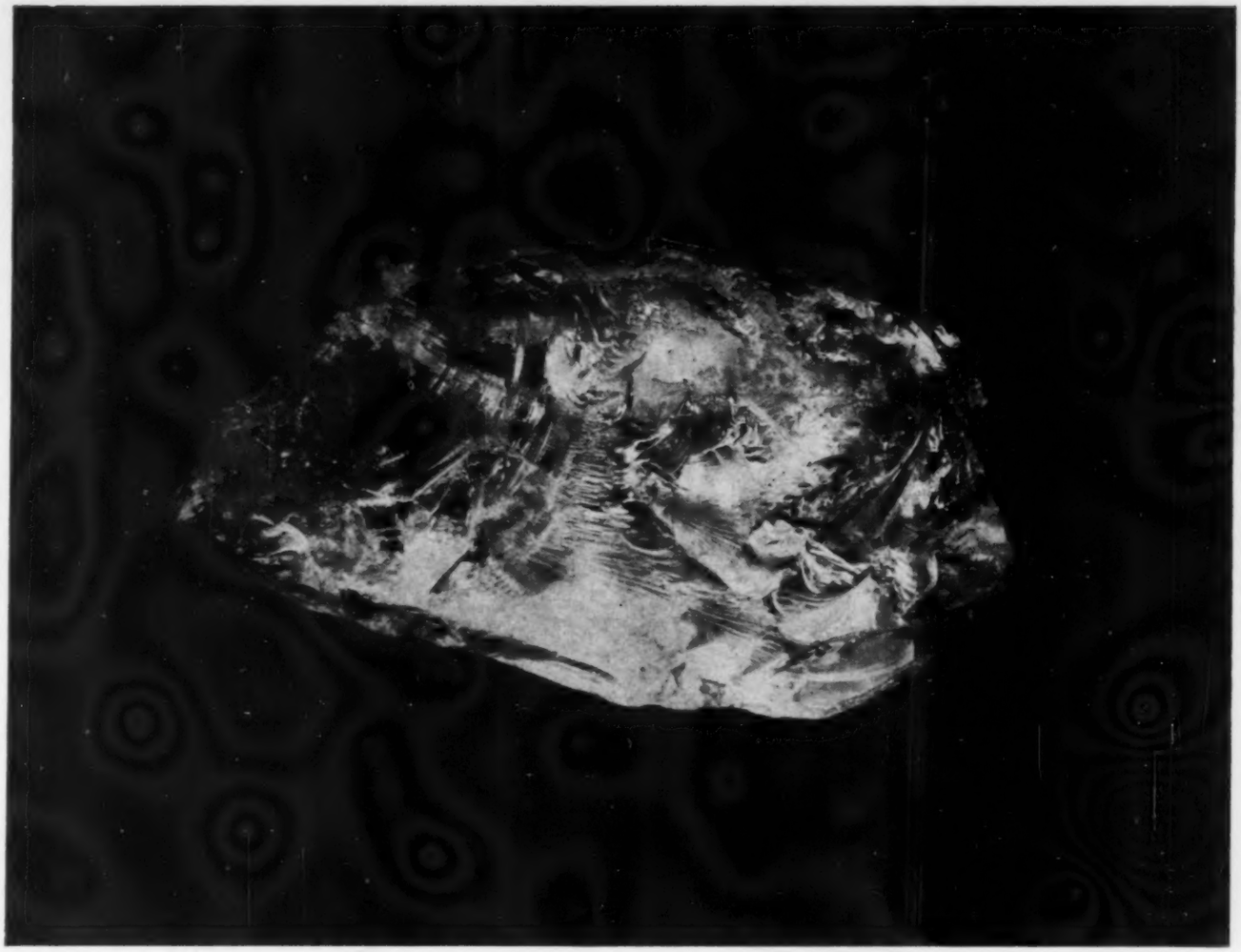

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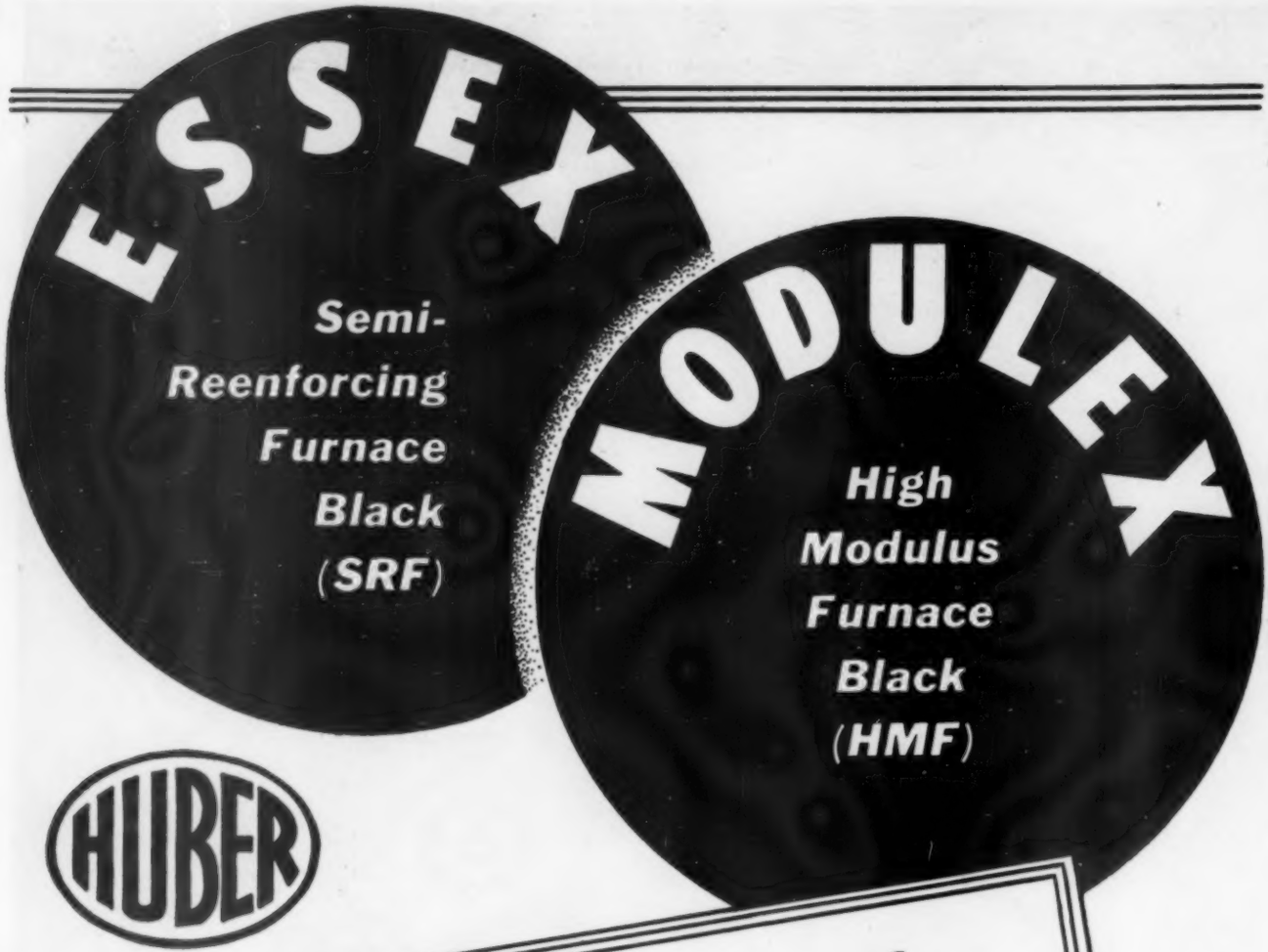
Photograph taken at the Hercules rubber laboratory

HERCULES DRESINATE 731

THE EMULSIFIER THAT MADE ROSIN RUBBER

*Reg. U. S. Pat. Off. by Hercules Powder Company

R7-1



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VOLUME 61

NUMBER 1

One of the World's Outstanding Rubber Journals

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Published on the 15th of each month by

PALMERTON PUBLISHING COMPANY, INC.

Printing office, East Stroudsburg, Pa.

Editorial and Advertising Offices, 250 West 57th St., New York 19, N. Y.

New England Representative—F. ROYAL CAREY, P.O. Box 133, Providence, R.I.
Western Representative—IRVING V. KOCH, 64 East Lake St., Chicago 1, Ill.
News Correspondents—WESTERN NEWS SERVICE, 316½ W. Pico Blvd., Los Angeles 15, Calif.; PHIL GLANZER, Tivoli Theatre Bldg., Toronto 1, Canada.

Entered as Second Class Matter, October 20, 1933 at the Post Office at East Stroudsburg, Pa., under Act of March 3, 1879. Subscription Rates: Domestic, $3.00 a year; Canada, $3.50; Foreign, $4.00. Single copies up to 3 months old, 35 cents; over 3 months old, 50 cents. Telephone COlumbus 5-2923, 5-2924.

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RUBBER AGE

Vol. 61, No. 1 APRIL, 1947

Pliolite Copolymer Resins and Their Uses

By H. R. THIES and W. H. AIKEN

Plastics & Coatings Dept., Chemical Products Div., Goodyear Tire & Rubber Co., Akron 16, Ohio

AN interesting and useful development has grown up in the last seven or eight years in the use of certain reinforcing resins. It was thought that perhaps a bit of the background describing these resins might be of general interest because this development is somewhat typical of the application of pure research to practical industrial problems.

In 1927 Bruson, Sebrell, and Calvert *(2)* described a method whereby ordinary pale crepe rubber, by a treatment with a material like tin tetrachloride or chlorostannic acid, was transformed into a resinous material of practically the same chemical composition as rubber but of a resinous nature rather than a rubbery nature. In the early middle thirties, this discovery was taken to the market as Pliolite. It was marketed extensively for use in the manufacture of acid, alkali, and water resisting paints, moisture-vapor proof and heat sealing paper coatings, wax mixtures and other applications.

Early Pliolite-Rubber Blends

In the development work on paints, it was found that this cyclized rubber resin was incompatible with a number of the usual paint plasticizers and that for certain usages a plasticizer was absolutely essential. Therefore, a fairly complete survey was made of the plasticizing materials and a few were found which were beneficial. The idea occurred to some of us working with the resin that perhaps rubber itself might serve as a plasticizer for the resinous Pliolite film. Mixtures were made in which 5 to 20 parts of rubber were utilized and it was found that while the idea was good, the solution viscosity of the mixture was not right for a practical brushing paint.

In doing this work, however, it was noticed that mixtures of cyclized rubber and rubber itself gave tough, horny products that somewhat resembled balata. As balata was selling for a dollar and a quarter a pound at that time, this looked like a fairly interesting field for more development work to be done, with the idea of making a synthetic balata stock from rubber and Pliolite resin.

Development of Golf Ball Stock

The first problem that was undertaken was the development of a golf ball cover stock. This was a rather extended, time-consuming development. Approximately two years were used in finding the right proportion of rubber and resin, and finding means and methods of vulcanizing covers on a production basis. The net result was, however, that a synthetic balata was offered to the trade which gave the golf ball manufacturers a tougher, longer flight ball than they could obtain with the cover stock then in use, and as a result, in 1939 and 1940, such representative concerns as Wilson Athletic Goods, Burke Golf Ball

Note: This article is based on a talk given by Mr. Thies before the Boston Rubber Group at Boston, Mass., on March 14, 1947.

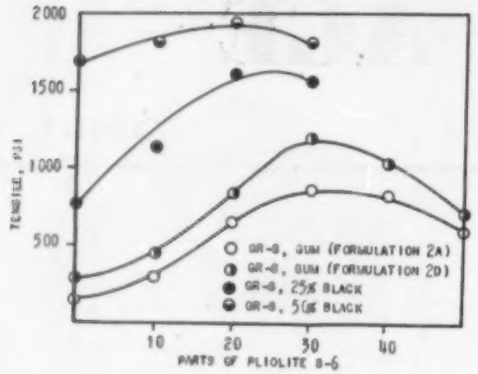

FIG. 1.

Company, and a number of other companies in the United States, together with the Campbell Company in Canada, used large quantities of this synthetic balata for covering their golf balls.

Having entered the sports field through the use of synthetic balata for golf ball covers, this material naturally came to the attention of some of the men in this field as being a tough, resilient product, easily moldable, so the thought occurred that perhaps it would make a good material for football helmets. Therefore molds were prepared and helmets made on an experimental basis. In 1940, preliminary tests looked very good. The development was then taken to the Armed Forces and a number of helmets were constructed from this material using a mixture of approximately 70% cyclized rubber resin and 30% rubber. These helmets were very successful in standing the hard usage to which Armored Forces tank crews subjected them and they were approved for purchase. Also in the fall of 1941, the Chicago Bears were equipped with helmets of this type and they gave an excellent report on their performance. Therefore, in the fall of 1941, it looked like this development was off to a good start in the sports field. (See reference *(4)* for description of these developments.)

At about this same time, and running concurrently with golf ball cover and helmet stocks, there was a usage developing in the wire insulation field where fast extrusion speeds and thin wall insulation characteristics were wanted. In doing this work, it was found that 10-20% of Pliolite added to a natural rubber wire insulation compound accomplished two purposes. The first of these was that it was possible to obtain thin wall insulation characteristics and smoother stock. The second was that the Pliolite resin functioned as a loading material, had excellent dielectric properties. Of course, being 100% rubber derivative it analyzed as pure gum in the insulation, thereby making it possible to meet certain specifications for this product.

After December 7th, 1941, the usage of Pliolite was very much curtailed. All of the rubber was needed for other purposes so that it was not available for paint, paper coatings, and sporting goods. Through the war our capacity was used entirely on field wire insulation. However, in 1944 this usage was disallowed in the R-1 Rubber Order.

Development of Pliolite S-1

Our Research Department had been working on the development of different materials that might accomplish the same purpose that cyclized rubber had. This work is fully described by D'Ianni, Naples, and Marsh *(3)*. They attacked the problem from the standpoint of using polyisoprene synthetic rubber and carrying out the same physical transformation by chemical means on polyisoprene as had been carried out on natural rubber. This product was taken to the market as Pliolite S-1.

It was found that Pliolite S-1 was in some respects deficient in its properties as compared to the natural rubber products when used as a paint vehicle or a moisture-vapor proof coating material, but that it would function very well as a rubber reinforcing material. Therefore, it did a very good job of pinch-hitting during 1944 and 1945 in the wire insulation

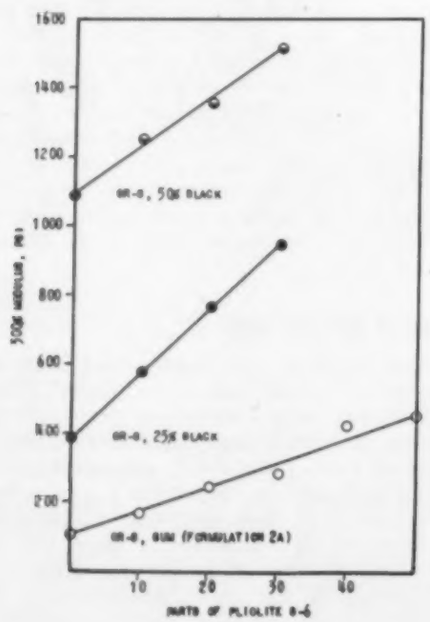

FIG. 2.

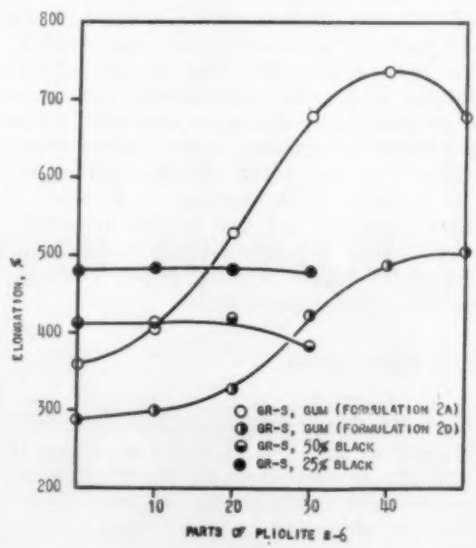

FIG. 3.

field. However, in 1945, the cyclizing catalyst which we used, chlorostannic acid, became very critical because of the shortage of tin. It was necessary, therefore, for us to use a much more difficult catalyst to handle in the process, boron trifluoride. The resin prepared from boron trifluoride was taken to the market as Pliolite S-2. With this catalyst, the reaction times were longer and consequently the resulting resin cost more, so it was felt that this material was not a satisfactory all-purpose industrial product.

In the work on synthetic rubber, the early investigation of butadiene-styrene copolymers indicated that there might be some interesting resinous copolymers obtained when the styrene content was increased beyond the range in which rubber-like properties were observed. The early research work involved preparation and evaluation of butadiene-styrene copolymers containing 65-98% styrene. It was found by Borders, Juve, and Hess *(1)* that useful resins could be prepared from butadiene and styrene in the range from 5-25% butadiene and 80-95% styrene. This is an interesting development that offers a family of resins heretofore not available, which promises to have very many interesting and useful industrial applications.

Pliolite S-3 came on the market in the middle of 1945 as a 15% butadiene-85% styrene copolymer and was used quite extensively as a reinforcing material for food gaskets and as an additive to wire insulation.

Characteristics of Pliolite S-5

Another of this family of resins was brought out in May of 1946. This product was called Pliolite S-5. It was distinguished from other products of this type by having good solubility in aromatic solvents. Solutions of this resin in aromatic solvents would tolerate 50% dilution with petroleum solvents. The examination of this resin in solvents showed that it was a practical material to use in the preparation of protective coatings, so much work was concentrated on this development.

This development work showed that protective coatings made from Pliolite S-5 were highly resistant to moisture, acid, alkalies, and other corrosive chemicals. The films laid down from solution dry by evaporation and do not require oxidation. They were further found to be resistant to alcohol, animal, vegetable and mineral oils, and greases. The films possessed good toughness and adhesion with a high degree of flexibility with a minimum amount of plasticizer. They have good stability, are highly resistant to abrasion and scrubbing, and have good aging characteristics.

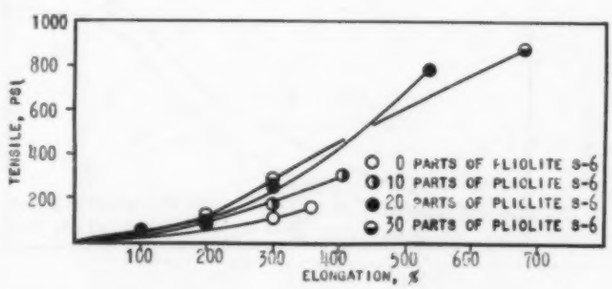

FIG. 4—Reinforcement of a GR-S Gum Stock with Pliolite S-6.

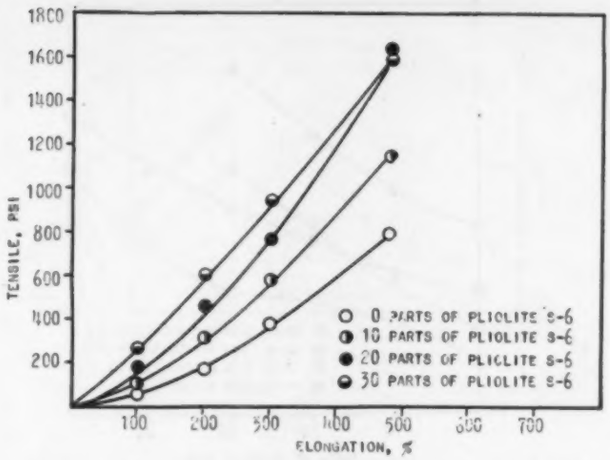

FIG. 5—Reinforcement of a GR-S Stock Containing 25 Parts of Black with Pliolite S-6

After doing all this development work, it then became evident that we had found a material which had a good chance of getting us back in the paint business. We accordingly sought advice from a number of our friends in the paint industry. They came to Akron to examine our development work and immediately expressed an interest in it. This product is now going into this industry in large volume. Pliolite S-5 resin is available as such and also in the form of some 20 or 30 Pliolite bases, which are dispersions of a single pigment in the resin. Therefore, a paint technologist can formulate protective paints either by using the clear resin, making the pigment dispersions himself, or he can purchase the pigment dispersed in Pliolite S-5 resin and formulate these Pliolite S-5 bases to meet his requirements.

Some very interesting results have come out of our work on pigment dispersions. Of course, being rubber people, the normal way for us to think of dispersing is on the rubber mill. Pliolite S-5, as it is manufactured, is a fine, white powder. This powder

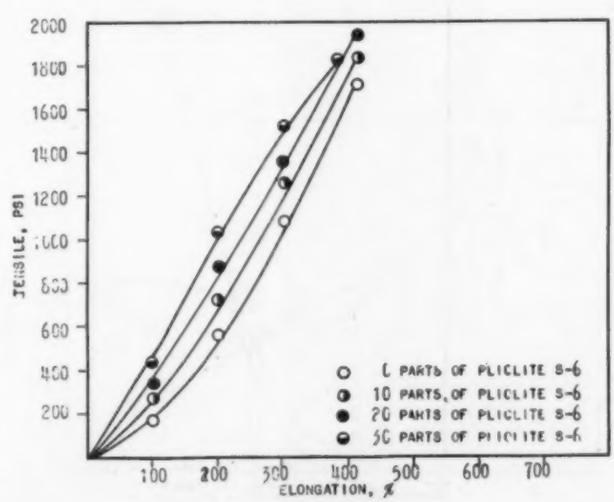

FIG. 6—Reinforcement of a GR-S Stock Containing 50 Parts of Black with Pliolite S-6.

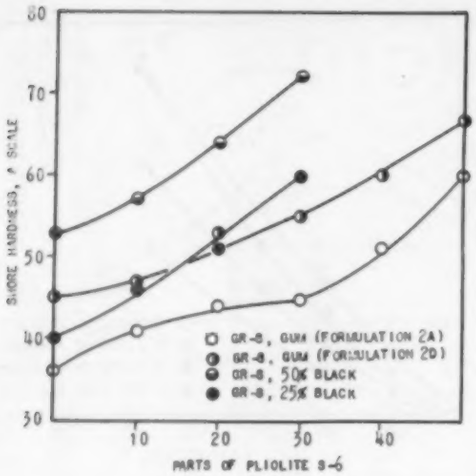

FIG. 7.

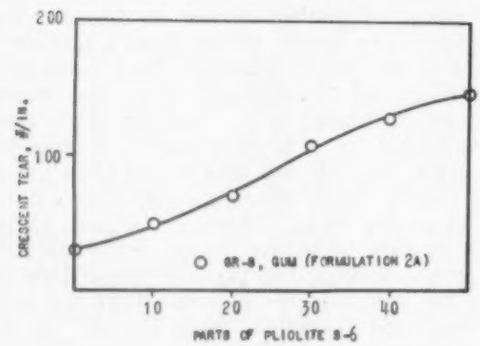

FIG. 8.

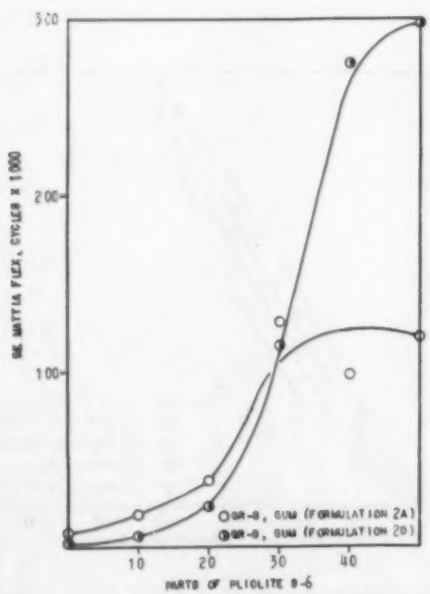

FIG. 9.

is placed on the mill and after about three passes, the powder sticks together and eventually works on the mill a good deal like rubber does. There is, however, one exception in that it is much tougher. The power consumption of an ordinary mill in milling rubber is about one h.p. per inch of mill length. A 60-inch mill will consume on rubber 60 h.p. However, when these resins are used, the h.p. consumption goes up to about 5 h.p. per inch on mill length or, on a 60-inch mill, a Pliolite S-5 batch will require 300 h.p. Therefore, with this large amount of work being done, the Pliolite S-5 offers a very excellent medium in which to disperse pigment. It is so good, in fact, that all of the Pliolite S-5 bases produce gloss finishes. Where flat finishes are required, it is necessary to use the flatting pigments in bulk and add them to the cut of the Pliolite bases.

Advantages of Pliolite S-6

With this introduction to the Pliolite family of resins, we would now like to turn our attention to Pliolite S-6. This resin is a high styrene-low butadiene resin specifically designed for rubber reinforcing. It is not as soluble in solvents as Pliolite S-5 and has a somewhat higher softening point. The material as it is manufactured is in the form of a slightly amber powder and is available as such, or in the form of masterbatches, in which as a rule 50 parts of rubber are utilized with 50 parts of resin. The resin itself can be added directly to the Banbury batch or the masterbatches can be added to the Banbury or conventional mill batches. It has the following advantages:

1. Reinforces GR-S and Buna N rubbers. The addition of Pliolite to GR-S and Buna N improves the tensile, elongation, tear, hardness, stiffness and flex life. This makes possible quality colored items of good durability. Pliolite S-6 also adds additional reinforcement to black stocks.

2. Increases stiffness. This resin is used in a number of production items where stiffness is desirable and where inherent toughness of rubber is needed.

3. Increases hardness. Where hardness is a problem and must be obtained without overloading or overcuring, Pliolite S-6 is useful.

4. Increases flex life. All our tests indicate that the addition of up to 20 parts of Pliolite S-6 to GR-S

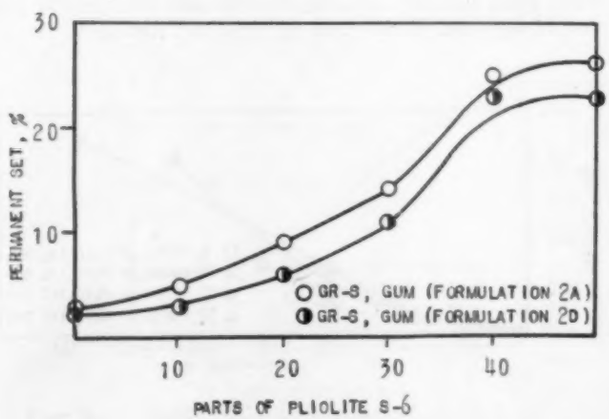

FIG. 10.

stocks very materially increases the flex life of these stocks. This makes it ideally suited as a component for shoe soles and other applications requiring good flex life.

5. Improves processing. At elevated temperatures, it apparently acts as a plasticizer for rubbers. This makes possible such jobs as the extrusion of thin-walled wire insulation, accurately centered, and of uniform wall thickness. Calendered stocks process easier and smoother, and, particularly with GR-S, have less shrinkage after calendering.

6. Excellent electrical properties make it a valuable component in wire insulation and other electrical applications.

Effect on GR-S

Figures 1 to 10 show the results on some of our tests with Pliolite S-6 in the representative GR-S formulations shown below:

FORMULATION 2-A	
GR-S	100.00
Zinc Oxide	5.00
PBNA	1.00
Stearic Acid	2.00
Sulfur	2.00
Methyl Tuads	.10
Altax	1.50
FORMULATION 2-B	
GR-S	100.00
Gastex Black	25.00
Zinc Oxide	5.00
Stearic Acid	2.00
PBNA	1.00
Barrett Oil BRT No. 7	5.00
Sulfur	2.00
Altax	1.50
Methyl Tuads	.10
FORMULATION 2-C	
GR-S	100.00
Gastex Black	50.00
Zinc Oxide	5.00
Stearic Acid	2.00
PBNA	1.00
Barrett Oil BRT No. 7	5.00
Sulfur	2.00
Altax	1.50
Methyl Tuads	.10
FORMULATION 2-D	
GR-S	100.00
Zinc Oxide	5.00
Stearic Acid	2.00
Sulfur	3.00
Methyl Tuads	.30
Altax	1.50

(This stock is more tightly cured than Formulation 2-A)

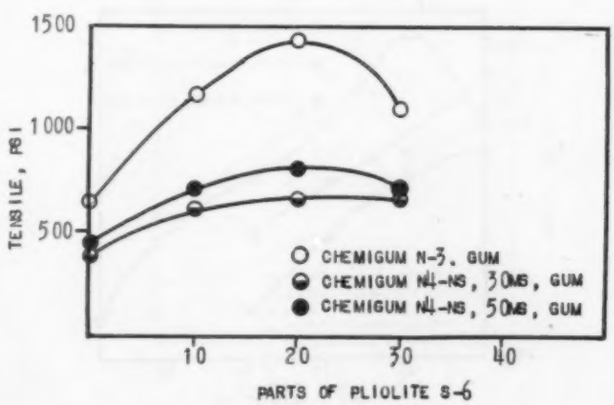

FIG. 11.

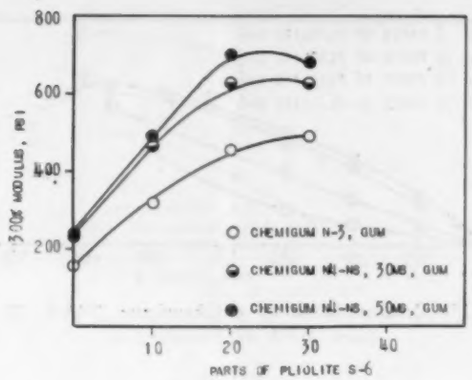

FIG. 12.

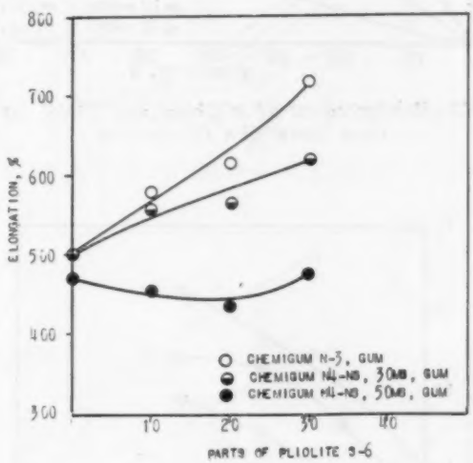

FIG. 13.

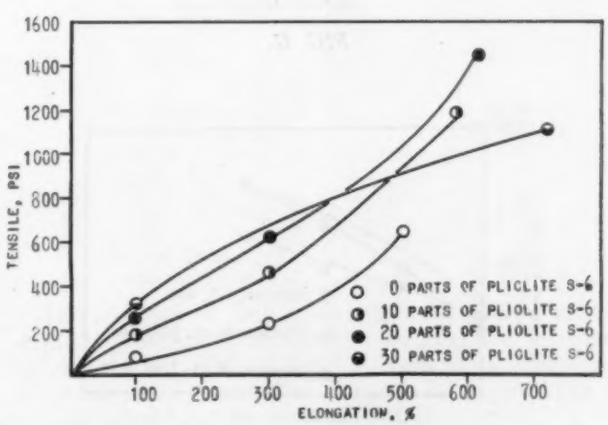

FIG. 14—Reinforcement of a Chemigum N-3 Gum Stock by Pliolite S-6.

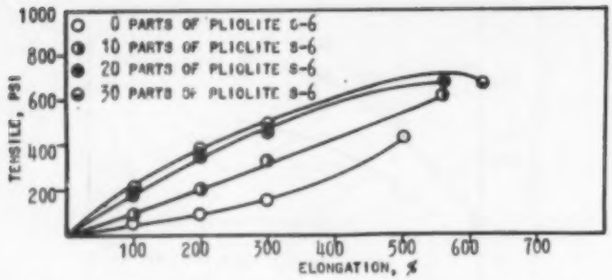

FIG. 15—Reinforcement of a Chemigum N4NS, 30 MS, Gum Stock by Pliolite S-6.

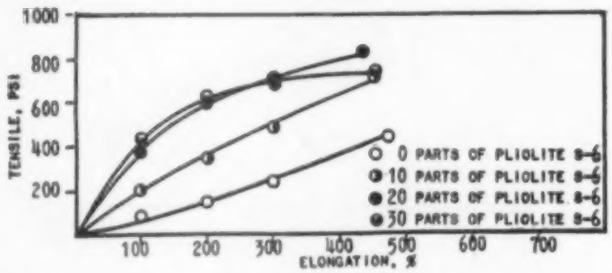

FIG. 16—Reinforcement of a Chemigum N4NS, 50 MS, Gum Stock with Pliolite S-6.

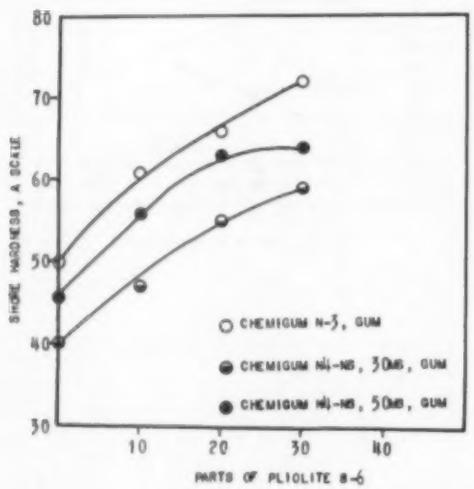

FIG. 17.

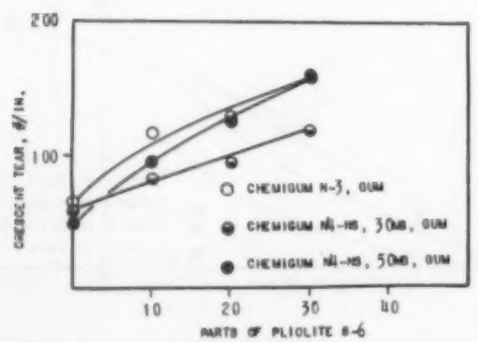

FIG. 18.

Addition of up to 30 parts of Pliolite S-6 to GR-S gum stocks greatly increases tensile strength. Incorporation of only 10 parts gives a two to three-fold increase. 20 parts of Pliolite S-6 gives tensile strength equal to that obtained with 25 parts of SRF black. S-6 also gives large increases in tensile strength to GR-S stocks containing 25 parts of black, but has a smaller effect on stocks containing 50 parts of black.

Addition of more than 10 parts of Pliolite S-6 to GR-S gum stocks appreciably increases elongation. It has no effect on the elongation of black GR-S stocks. It is interesting that in GR-S formulation 2-A the maximum tensile and elongation are obtained at 40 parts of Pliolite S-6. This stock has twice the elongation and eight times the tensile of one containing no Pliolite S-6. Pliolite S-6, therefore, makes GR-S gum stocks both longer and stronger.

Addition of Pliolite S-6 to GR-S gum stocks greatly improves the flex life. Addition of 30 parts gives more than a ten-fold increase.

Pliolite S-6 improves the tear of GR-S gum stocks. Ten parts of Pliolite S-6 doubles the tear strength.

Pliolite S-6 increases the hardness of gum and black GR-S stocks 4 to 6 points for each 10 parts of Pliolite S-6 added. A GR-S gum stock containing 25 parts of Pliolite S-6 has about the same hardness of a stock containing 25 parts of carbon black.

Pliolite S-6 increases the 300% modulus of both gum and black GR-S stocks. A GR-S gum stock containing 25 parts of Pliolite S-6 has approximately the same stiffness as a stock containing 25 parts of black.

Addition of Pliolite S-6 reinforces GR-S gum stocks, improving tensile, elongation, stiffness, hardness, tear and flex life, thus making possible the production of colored items of good durability. Addition of Pliolite S-6 to black GR-S stocks also improves many of their properties.

Effect on Chemigum

Figures 11 to 18 show representative tests on Chemigum butadiene-acrylonitrile rubbers compounded with Pliolite S-6 in the formula shown below:

FORMULATION 3-A

Chemigum	100.00
Zinc Oxide	5.00
Stearic Acid	1.00
Sulfur	1.50
Methyl Tuads	1.50

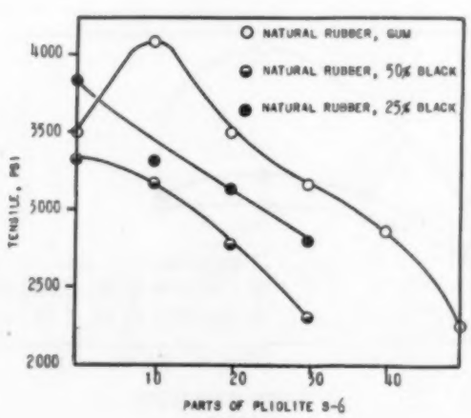

FIG. 19.

Pliolite S-6 greatly increases the tensile strength of Chemigum N-3 gum stocks. 15 parts doubles the tensile strength. Pliolite S-6 has a smaller effect in increasing the tensile strength of Chemigum N4 of lesser acrylonitrile content.

Pliolite S-6 appreciably increases the elongation of Chemigum N-3 and N4-30 MS gum stocks. It has no effect on the elongation of 50 MS gum stocks.

The addition of Pliolite S-6 to gum stocks of Chemigum N-3, Chemigum N4 NS, 30 MS, and Chemigum N4 NS, 50 MS improves tear. The improvement is greater in the case of Chemigum N-3 and Chemigum N4 NS, 50 MS.

Gum stocks of Chemigum N-3; Chemigum N4 NS, 30 MS; and Chemigum N4 NS, 50 MS; gum stocks are all increased in hardness by the incorporation of Pliolite S-6,

Addition of Pliolite S-6 to gum stocks of Chemigum N-3, Chemigum N4, NS, 30 MS and Chemigum N4 NS, 50 MS gives reinforcement and makes colored stocks of good durability possible. Tensile, elongation, tear, stiffness, and hardness, of all these rubbers are improved by Pliolite S-6.

Effect on Natural Rubber

Figures 19 to 26 show the effect of Pliolite S-6 in the natural rubber formulations shown below:

FORMULATION 1-A

No. 1 Smoked Sheet	100.00
Zinc Oxide	5.00
Stearic Acid	1.00
PBNA	1.00
Sulfur	2.75
Methyl Tuads	.10
Altax	1.00

FORMULATION 1-B

No. 1 Smoked Sheet	100.00
Gastex Black	25.00
Zinc Oxide	5.00
Stearic Acid	1.00
PBNA	1.00
Barrett Oil BRT No. 7	5.00
Sulfur	2.75
Methyl Tuads	.10
Altax	1.00

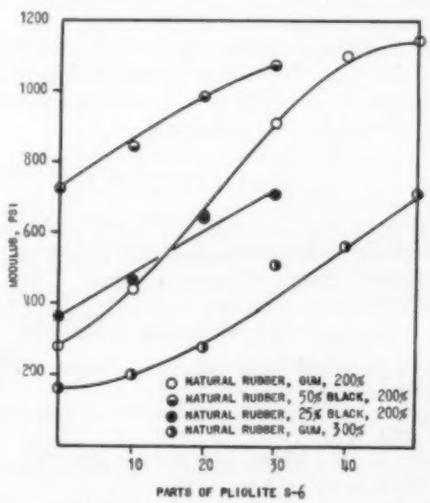
MODULUS, PSI
PARTS OF PLIOLITE S-6
NATURAL RUBBER, GUM, 200%
NATURAL RUBBER, 50% BLACK, 200%
NATURAL RUBBER, 25% BLACK, 200%
NATURAL RUBBER, GUM, 300%

FIG. 20.

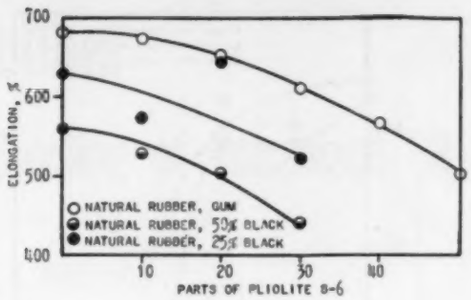

FIG. 21.

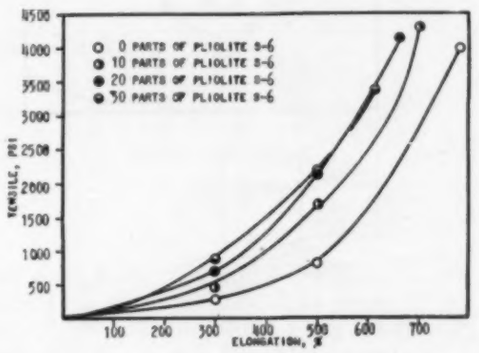

FIG. 22—Effect of Pliolite S-6 on a Natural Rubber Stock.

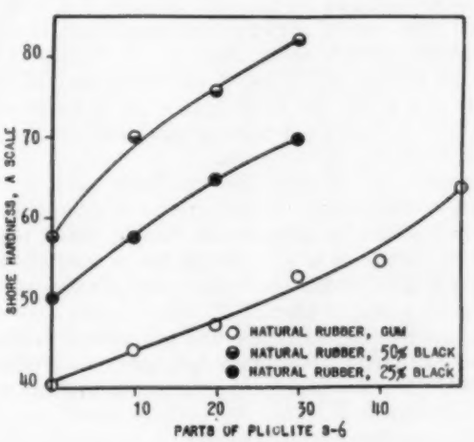

FIG. 23.

FORMULATION 1-C

No. 1 Smoked Sheet	100.00
Gastex Black	50.00
Zinc Oxide	5.00
Stearic Acid	1.00
PBNA	1.00
Barrett Oil BRT No. 7	5.00
Sulfur	2.75
Methyl Tuads	.10
Altax	1.00

The stiffness of both gum and black natural rubber stocks, as measured by 200% modulus, are increased by addition of Pliolite S-6. A gum stock containing 25 parts of Pliolite S-6 is equal in 200% modulus to a stock containing 25 parts of black.

Addition of Pliolite S-6 increases the hardness of both gum and black natural rubber stocks. Twenty-

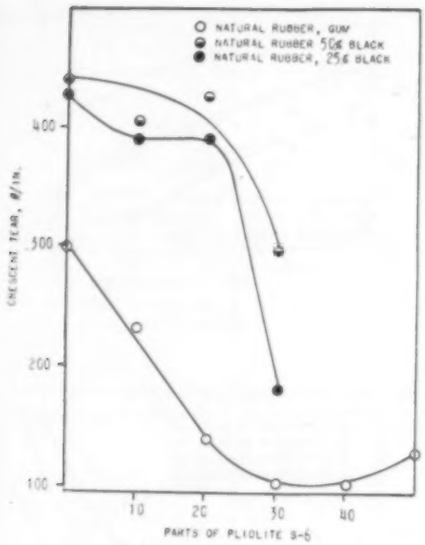

FIG. 24.

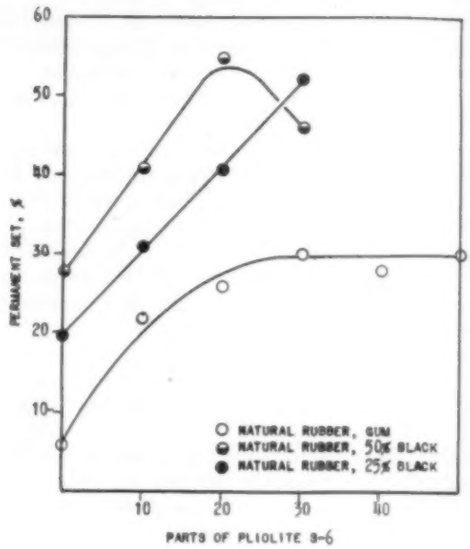

FIG. 26.

five parts of Pliolite S-6 in a gum stock gives hardness equal to 25 parts of black, 45 parts of Pliolite S-6 in a gum stock gives hardness equal to 50 parts of black. Ten parts of Pliolite S-6 in a stock containing 25 parts of black gives hardness equal to 50 parts of black.

Incorporation of 10 parts of Pliolite S-6 in a natural rubber gum stock slightly increases tensile strength. In the test formula used, 20 parts of Pliolite S-6 gives the same tensile as 25 parts of black, and 25 parts of Pliolite S-6 gives the same tensile as 50 parts of black. Addition of Pliolite S-6 to natural rubber stocks containing black reduces tensile.

Addition of Pliolite S-6 to both gum and black natural rubber stocks slightly reduces elongation. The decrease caused by 10 parts of Pliolite S-6 is negligible. The elongation of a gum stock containing 25 parts of Pliolite S-6 is about the same as that of a stock containing 25 parts of black.

Pliolite S-6 reduces flex life of natural rubber gum stocks. 10 parts of Pliolite S-6 have no effect on the flex life of black stocks, but greater amounts reduce flex life.

Incorporation of Pliolite S-6 in natural rubber gum stocks appreciably reduces tear. The reduction is much less in black stocks if the amount of Pliolite S-6 added is limited to 20 parts or less.

Pliolite S-6 increases the permanent set of both gum and black natural rubber stocks.

Pliolite S-6 greatly increases the stiffness and hardness of both gum and black natural rubber stocks without significantly affecting the other properties.

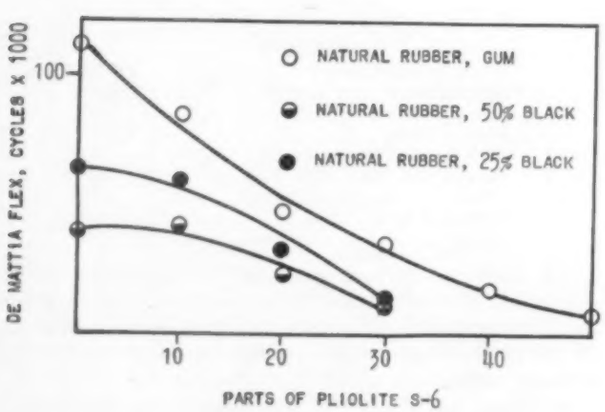

FIG. 25.

Summary

In summing up the results of this work then, we find the situation about as follows:

1. Interesting commercial products were developed before the war from cyclized rubber. These products were used in manufacturing protective, decorative and functional coatings for steel, wood, concrete, paper and other applications. They were also used for rubber reinforcing and compounding.

2. During the war and afterwards, a complete new line of resins has been developed for these purposes: First, from cyclized polyisoprene synthetic rubber and later from copolymer type butadiene styrene resins.

3. From a comparison of the properties and performance of the copolymer type resins every indication seems to be that they have a definite field and will well maintain their position when our economy returns to plentiful supply of everything.

ACKNOWLEDGMENT

The writers wish to acknowledge the helpful assistance of H. S. Sell and R. J. McCutcheon in obtaining the compounding data discussed.

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(2) Bruson, Sebrell, and Calvert, *Ind. Eng. Chemistry*, Vol. 19, page 1033 (1927).
(3) D'Ianni, Naples, Marsh, and Zarney, *Ind. Eng. Chemistry*, Vol. 38, page 1171 (Nov., 1946).
(4) Thies, *Ind. Eng. Chemistry*, Vol. 33, page 389 (March, 1941).

Swelling of Rubber

IV—Effect of Carbon Blacks on the Swelling of Vulcanized GR-S

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Engineering Experiment Station, University of Delaware, Newark, Delaware

IN the course of previously reported investigations on the swelling of vulcanized rubbers in organic liquids carried out in this laboratory, MPC black was used in the test compound. In consideration of the extensive investigations made in recent years as to the effect of particle size and structure of carbon blacks on various rubber properties* it was thought of interest to measure their effect on the swelling of vulcanized rubber compounds.

Although a number of studies have been reported in the literature on the effect of fillers on swelling of rubber compounds, no study has included carbons over a range of particle size and structure, with the exception of an investigation of carbon blacks in natural rubber and neoprene published quite recently by Buist and Mottram *(2)*. The findings of Buist and Mottram are discussed later in the paper.

Carbon Blacks Tested

Six blacks were used in the investigation, chosen to be representative of the principal groups of carbon blacks used in rubber compounding, and to include representatives of those carbons classed as structure blacks. The identity of the blacks, their surface area and their oil absorption values are given at the beginning of the table of results.

The values for surface area were obtained by private communication from the research laboratories of the Columbian Carbon Company, where they had been estimated from the rub-out color test in mineral oil *(3)*. In the case of the SRF and MPC blacks, the particular samples of black used in this investigation were tested.

(*) An up to date summary of the present knowledge of carbon blacks for rubber has been given by H. A. Braendle *(1)*.

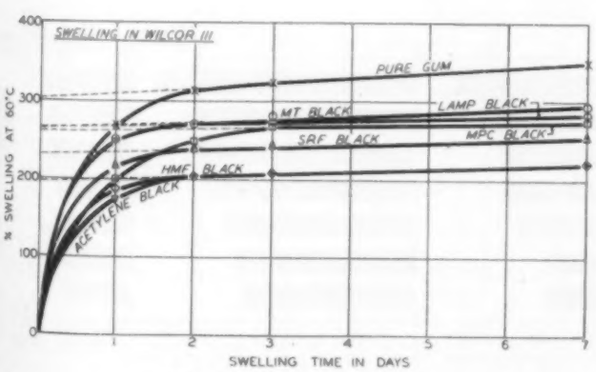

FIG. 1—Swelling at 60°C.

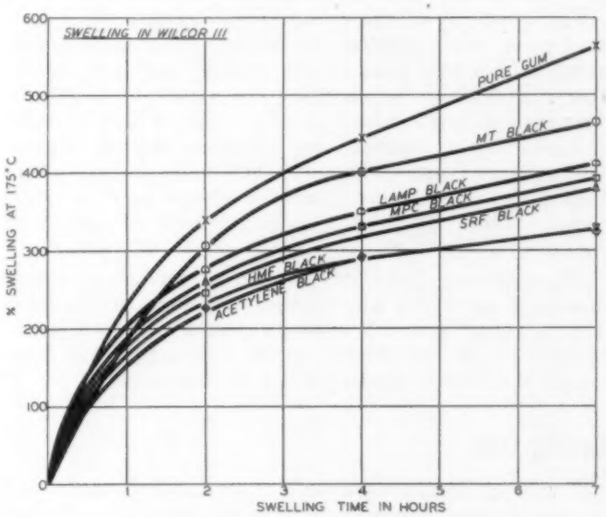

FIG. 2—Swelling at 175°C.

With the other blacks the values are average values, representative for the brand.

Oil absorption was measured in our laboratory, and is reported as the amount of linseed oil necessary to give a stiff paste in gallons per 100 pounds of black. The method used for the tests was the A.S.T.M. method for determining oil absorption of pigments *(4)*, except that the linseed oil used was of the alkali refined type, and that the mixing was carried out on a polished steel plate. The values measured in our laboratories show the same trend, but are in general about 10% higher than values found in duplicate tests made at the laboratories of the Columbian Carbon Company, using the same oil and black samples with their modified method *(3)*.

Test Formula and Physical Data

GR-S was used as the rubber hydrocarbon for the test compounds, since it gives an appreciable swelling in most organic liquids, but is not subject to the same extent as natural rubber to disintegration in the liquids, which might falsify the results.

All six blacks were mixed in the test formula † given below in parts by weight:

(†) The test formula differs from the MPC formula used in the previous investigations reported from this laboratory in that it does not contain any plasticizer. This test compound is consequently considerably stiffer than the previously used one, and the swelling is accordingly of lower magnitude.

GR-S	100.00
Stearic acid	1.00
Sulfur	2.00
Zinc oxide	5.00
Benzothiazyl disulfide	1.50
Diphenylguanidine	0.25
Black	45.00

The compounds were all cured 50 minutes at 45 lbs. These conditions were chosen in order to reach optimum cure with those blacks which retard the cure. In a previous investigation *(5)*, it had been established that the effect of over-curing a GR-S compound on the swelling in organic solvents is small.

The principal physical test data of the test compounds, including a control compound without black, are given in the table of test results.

The plasticity of the uncured compounds was measured on a Scott plastometer having both platens flat, using a 15-pound load on the spindle, and a temperature of 212°F. in the platens. Figures reported are the compression in thousandths of an inch in 2½ minutes of a plied-up, cylindrical test specimen, having original dimensions of approximately 0.66 inches in height and 1.45 inches in diameter, initially compressed to 0.600 inches. Data reported are the average of two tests checking within 10%.

Physical properties of the cured compounds were measured by A.S.T.M. methods *(6)*. Shore hardness was measured after 5 seconds' and after 30 seconds' application of the durometer in a stand, using three tensile specimens piled up for a test sample.

Swelling Tests

Swelling liquids used were n-heptane, benzene and a low-viscous unsaturated petroleum oil (Wilcor Reclaiming Oil 111). Swelling tests were carried out in heptane and benzene at room temperature (25°C.), and in the petroleum oil at both 60°C. and 175°C. Swelling at the higher temperature with this liquid was included in order to have one series of measurements under conditions where the swelling increment is predominant in the total swelling behaviour.

The tests were carried out by immersing samples approximately 4.5 x 2 x 0.2 cm., cut from tensile slabs, in about 120 cc. of the swelling liquid (sufficient to cover the sample after swelling) in test tubes of 35 mm. inside diameter. For the tests at elevated temperature, the test tubes were immersed in a thermostatically controlled bath having a temperature fluctuation of not more than ± 1°C. Measurements of volume of the samples before and after swelling were made by displacement of liquid in a tube of dilute sodium oleate solution equipped wth a calibrated inclined side arm. The apparatus and test method have been described elsewhere *(7)*.

Volume increase of the test specimens in n-heptane and benzene was measured after 1, 2, 3 and 7 days' immersion at room temperature. After 2 days the volume had become constant, so that this figure represents the swelling maximum under the conditions of test. The swelling at 60°C. of the unsaturated petroleum oil was measured after 1, 2, 3 and 7 days' immersion, and, at 175°C., after 2, 4 and 7 hours' immersion.

The test data are reported in the table of test results. The figures in all cases are the average of measurements on at least two samples, and are reported as the per cent increase in volume calculated on the basis of rubber hydrocarbons. In Figures 1 and 2 are given the time swelling curves for the swelling in the unsaturated petroleum oil at the two temperatures, calculated on the rubber hydrocarbon.

Relation of Swelling to Structure of Blacks

The results of the swelling tests on the seven test compounds are summarized graphically in Figure 3. The bars for the swelling in n-heptane and benzene represent the swelling maxima, since the swelling had become constant after 48 hours. The bars in the third portion of this figure represent swelling in the unsaturated petroleum oil after 7 days at 60° C., and show the same trend as the swelling maxima given in the table. These maxima were read from Figure 1 by extrapolation of the straight portion of the time swelling curve to the ordinate.

In these first three sets of bar graphs in Figure 3, it can be seen that the difference in swelling between a pure gum compound and one loaded with any of the blacks is greater than can be explained on the basis of simple dilution of the rubber hydrocarbon, but that the differences in swelling between the compounds loaded with various blacks are comparatively small. However, there is a consistent tendency for the compounds containing the HMF black and the acetylene black, both high structure blacks, to swell less than the others. To a smaller degree this decreased swelling is also exhibited by the SRF compound.

The last set of bar graphs in Figure 3, representing the swelling of the test compounds after 7 hours in the unsaturated petroleum oil at 175°C., shows that the

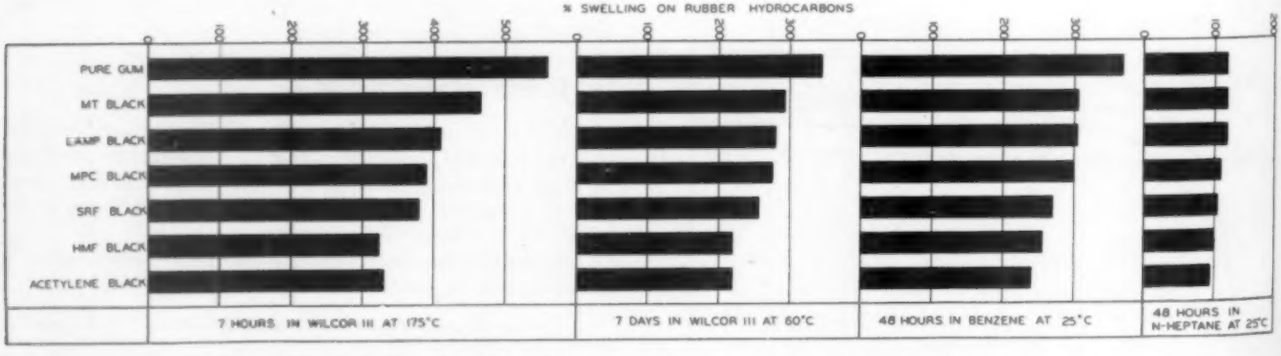

FIG. 3—Summary of results of the swelling tests on the seven test compounds.

TABLE OF TEST RESULTS

Type of carbon	None	MT black	Lamp black	SRF black	HMF black	Acetylene black	MPC black
Brand name	...	Thermax	Velvet	Pelletex	Phil-black A	Shaw-nigan	Standard Micronex
Surface area (acres/lb.)	...	1.1	2.6	3.6	4.8	7.3	11.8*
Oil absorption (gals./100 lbs.)	...	3.8	18.3	9.3	17.7	34.1	15.2
Physical properties of test compound:							
Plasticity (compression in 0.001 in.)	215	195	115	140	95	60	70
Shore hardness— 5 seconds	44	54	64	62	69	70	69
—30 seconds	40	51	59	58	66	67	64
Modulus (psi)—300%	140	560	780	1300	2510	2120	1360
—500%	...	...	1280	....	....	....	2980
Tensile at break (psi)	140	760	1340	1720	2510	2270	3230
Elongation at break (%)	300	360	510	370	300	340	530
Set at break (%)	6	6	15	7	7	12	20
Swelling in n-heptane at 25° C. (% on RHC)							
1 day	110	110	120	100	95	95	105
2 days	120	120	120	105	100	95	110
3 days	...	...	110	100	90	95	105
7 days	115	110	120	105	95	95	110
Swelling in benzene at 25° C. (% on RHC)							
1 day	380	300	305	275	230	230	285
2 days	370	305	305	270	255	240	300
3 days	385	300	...	...	240	230	...
7 days	365	325	310	275	245	240	300
Swelling in Wilcor 111 at 60° C. (% on RHC)							
1 day	270	250	250	220	190	175	200
2 days	315	270	270	240	205	205	245
3 days	325	280	275	245	210	210	270
7 days	345	295	280	255	220	220	275
Swelling maximum (read from Fig. 1)	300	265	265	230	195	195	260
Swelling in Wilcor 111 at 175° C. (% on RHC)							
2 hours	340	305	275	260	230	225	245
4 hours	445	400	350	330	295	290	330
7 hours	560	465	410	380	325	330	390

* The particular sample used had unusually large surface area for this brand.

differences in effect of blacks on swelling is exaggerated under conditions where swelling increment is an important factor. This is more clearly shown in Figure 2. There is a definite tendency at 175°C. for the compounds with those blacks where initial rapid swelling was greatest to exhibit greater swelling increment, as shown by somewhat steeper slope of the latter straight portion of the curve.

A comparison of the swelling behaviour with the figures for 300% modulus in the table of test results shows that these correlate, in that those blacks which caused the greatest reduction of swelling also resulted in abnormally high modulus in respect to their surface area. Both the HMF black and the acetylene black compounds show abnormally high modulus, as does possibly also the SRF compound to a lesser degree.

This parallel is especially interesting since it has been concluded from extensive studies of carbon blacks in both natural rubber and GR-S that modulus is highly dependent on the structure of carbon blacks. Detailed discussions have been presented by Wiegand *(8)* as well as in other publications from the Columbian Carbon Company laboratories *(3, 9)*, and by Parkinson *(10, 11)*.

It is surprising that lamp black, the other structure black, did not exhibit any unusual properties either as to the modulus or the swelling of the vulcanized compound. That the black by itself, and also in the uncured compound, exhibits structure, is shown by the figures for oil absorption and for plasticity, the former being much higher, and the latter much lower than those for the other blacks in the same surface range. There is also evidence for structure in the cured compound in the hardness, which is somewhat higher than that of the compound containing the SRF black, having a greater surface area than the lamp black. This behaviour suggests that the structure of the lamp black in the cured GR-S compound is of such nature that it does not affect properties which involve resistance to stretching.

Results published in the literature by various investigators differ as to whether or not lamp black compounds of GR-S exhibit higher modulus than is to be expected from the particle size of the black. Although Parkinson *(11)** and Wiegand *(8)* have found abnormally high values, this behaviour is not revealed in the results published by Drogin *(12)* and by Garvey and Freese *(13, 14)*†. However, Wiegand *(8)* has pointed out that, since, in contrast to Hevea, the modulus of GR-S is most dependent on surface area, "a coarse 'Structure' carbon like lampblack has inherently low modulus because of its low specific surface. Hence the effect of lampblack structure is less marked than with Hevea."

(*) Data reported as elongation at given load.

(†) The data given in the report from the Rubber Director's Office *(14)* are taken from a report on a study including a number of brands of lamp black. These results should, therefore, be more conclusive than those found on any one brand.

Buist and Mottram *(2)* have published the results of a study on the effect of carbon blacks on the physical properties of natural rubber and neoprene, including swelling in benzene. Their findings show, in general, the same phenomena for smoked sheets and neoprene as do ours for GR-S, in that they found in general the same relationship between modulus and swelling for both rubbers, and in that their figures did not reveal any significant change in swelling behaviour with surface area of the black. The lamp black used in their study also did not produce swelling lower than that of compounds with the non-structure blacks.

Summary and Conclusions

It was found that there is a small but consistent difference in swelling of GR-S compounds loaded with various blacks. The HMF black, the acetylene black, and, to some extent, the SRF black used in this investigation were found to result in lower swelling of a vulcanized compound than the other blacks tested. This correlates with the fact that the compounds with these three blacks exhibited abnormally high modulus.

It is suggested that the resistance to swelling imparted to a rubber compound by a carbon black is closely related to the structural characteristics of the black in the cured compound, especially since swelling of the compound does not appear to be affected by the surface area of the black either in GR-S, or, as shown by the results of other investigators, in natural rubber or neoprene. Swelling tests might therefore profitably be used as an indication of the degree of rigidity of structure of carbon blacks in vulcanized rubbers.

ACKNOWLEDGMENT

The authors are indebted to W. C. Goodrich of the research laboratories of the Columbian Carbon Company for supplying the values for surface area and for running parallel oil absorption tests.

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Loxite Industrial Adhesive Compounds

THE Firestone Industrial Products Co., Akron, Ohio, recently made some information available on its Loxite industrial adhesive compounds. Developed during the war, these compounds are based on various forms of synthetic rubber and certain types of synthetic resins which possess highly desirable characteristics for industrial adhesives.

Available as adhesives, dispersions, latex and compounded latex dispersions, the compounds are generally said to have the following characteristics: strength of bond; ease of application; effectiveness over a wide range of temperatures, ranging from—30°F. to as high as 300°F.; non-toxicity; unlimited storage stability under ordinary storage conditions; and high tensile strength of bond.

Some of the more outstanding of these compounds are: Loxite Adhesive 3000, a fast-drying synthetic resin base adhesive which is said to provide a high strength bond between either natural or synthetic rubber stocks and metals by vulcanization; Loxite Adhesive 3001, a synthetic rubber, resin, solvent-dispersed compound which may be used either as a wet bonding cement, or as a thermoplastic or thermosetting adhesive, productive of a tough, flexible, curable bond; Loxite Adhesive 4004, an easily applied reclaim synthetic resin base adhesive which is particularly recommended as an efficient cold bonding cement between rubber and strip metal; Loxite Adhesive 5008, an all-purpose thermoplastic synthetic rubber adhesive with exceptionally high tack, which is retained indefinitely, and a strong cohesive film strength; Loxite Adhesive 6000, a slow thermosetting or curing type of synthetic rubber adhesive with a high initial bonding strength which steadily improves with age.

A wide field of usefulness is said to have been found for Loxite compounds. The company recommends the use of Loxite Adhesive 3000 for bonding rubber to metal; Loxite Adhesive 3001 for bonding plastic brake lining to metal brake shoes, laminating some types of plastic film and metal foil, bonding plastic shoe soles to leather uppers, patching or cementing plastic fabrics, binding books, cementing colored plastic lenses to automobile taillights, and bonding together plastic piano key fittings; Loxite Adhesive 5008 for combining paper, fabric, metal foil and leather, laminating plywood and veneers for radios and other products, and manufacturing relatively inexpensive moisture barrier materials.

In the automotive industry, Loxite Adhesive 4004 has been used to attach fiber trunk lining to the steel walls of trunk compartments, as well as to laminate the fiber linings themselves. It also has been used to cement rubber step mats to automobile running boards and rubber linings to car door edges. Loxite Adhesive 6000 is reported particularly well adapted to the adhesion of rubber to metal in aircraft construction, such as attaching step pads to wing surfaces, cementing foamed rubber cushioning to cabin walls, or sealing the edges of windshields.

Neoprene in Passenger Car Tires

By MAYNARD F. TORRENCE
Rubber Laboratory, E. I. du Pont de Nemours & Co., Wilmington, Del.

NEOPRENE can be used as part or all of the elastomer to produce passenger car tires. However, its practical value and the extent of its utilization depend on the relationship between several factors difficult to evaluate, such as: quality, cost, the tire design involved and the adaptability of the plant to the use of neoprene. While eventually this value will be determined through competitive tire merchandising, it is believed that the data obtained from over 10,000,000 test tire miles have established several facts worthy of serious consideration in future tire development programs.

Obviously, the best use of neoprene is in a tire designed to take advantage of the properties of neoprene rather than in one designed to minimize the deficiencies of other elastomers. A study of neoprene's usefulness in the various parts of a tire is helpful in developing the design features which are favorable to the use of neoprene.

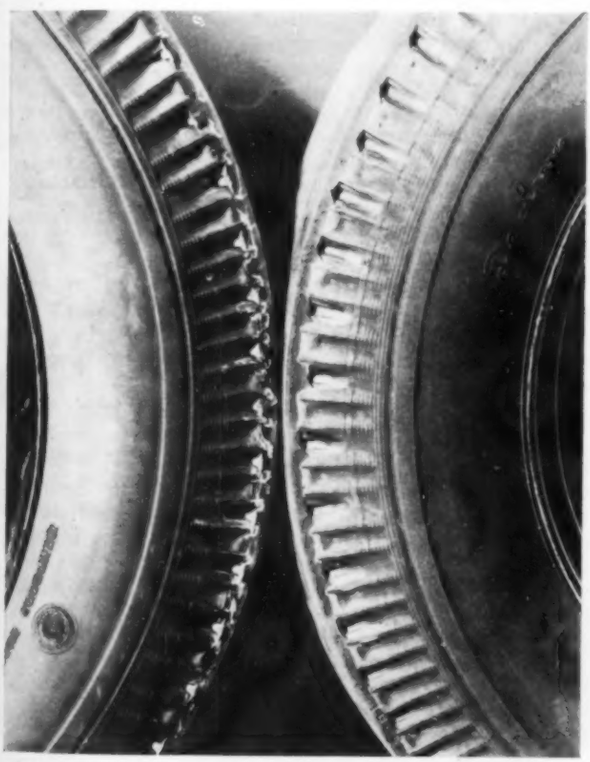


FIG. 1—Two tires after five years of continuous service in alternate positions on the same car. The tire on the left has a neoprene tread and sidewall. Both have been retreaded. Not only does the rubber sidewall show the usual amount of sun-checking but it has lost much of its design detail in the shoulder region. Both tires were cured and retreaded in identical molds. The rubber tire has failed. The neoprene tire has again been retreaded and is still in service.

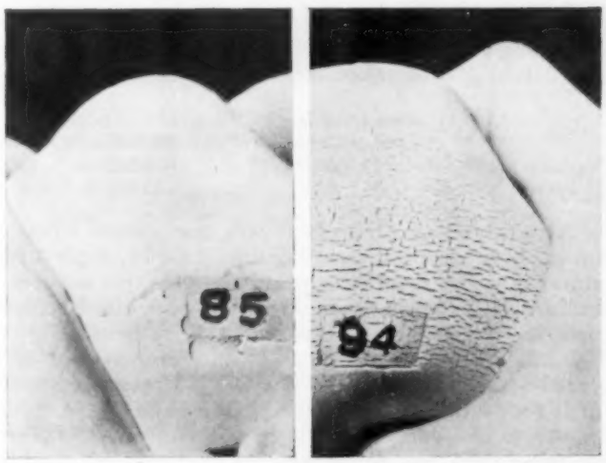


FIG. 2—Opposite segment of the same sidewall after 13 months' service. Stock No. 94 (right) is natural rubber. Stock No. 85 (left) is a blend of neoprene and natural rubber (50 parts of each).

Sidewalls Improved

The use of neoprene sidewalls or sidewall veneers to eliminate sun-checking and radial cracking and to reduce sidewall cutting and wear offers an easy method of improving tire quality and appearance at little or no additional cost. The superior performance of a neoprene stock for this use often allows a reduction of sidewall thickness to offset any extra cost of the compound. In addition to an improvement in quality, this application provides new tire appearance throughout the life of the tire.

The same protection is provided in both black and white sidewalls. White neoprene stocks discolor somewhat when exposed to sunlight but if the neoprene is blended with an equal amount of pale crepe in the proper compound, protection against sun-checking is retained without objectionable discoloration.

Test results establishing the sunlight resistance of tire sidewalls must of necessity be recorded as visual observations. Fig. 1 shows the results of a five-year service test. The tire pictured on the left has a neoprene tread and sidewall. Not only does the rubber sidewall pictured on the right show the usual amount of sun-checking, but it has lost much of its design detail in the shoulder region. Both tires were cured and re-

treaded in identical molds. The neoprene tire has been retreaded for the second time and is still in service. The rubber tire is out of service due to failure. Fig. 2 shows a comparison of opposite segments of the same sectional sidewall after 13 months' service. Stock No. 94 is a natural rubber composition; No. 85 is a blend of neoprene and natural rubber.

Fleet Tests Show Value

Improved carcass performance should result from the use of coat stocks having greater fatigue resistance and better aging. The superior fatigue resistance of neoprene over that of natural rubber is shown by the following comparison of the two elastomers used as ply coat stocks and tested on a U. S. type flexing machine:

	Number of Flexures to Failure	
	Coat on Cord	*Coat on Square Woven Fabric*
Natural Rubber	13,500	6,750
Neoprene	33,750	13,500

An analysis of carcass failures that caused tire removal in a test of several hundred 6.00-16, 4-ply tires run over a period of three years indicates that neoprene has an advantage over either GR-S or natural rubber both in frequency of the failures and in the total mileage lost. The tires were of the same construction and cured in identical molds. The GR-S tires were standard production tires whose performance had been shown to be among the best. The frequency of failure of these tires was determined by dividing the number of tires that failed for any one cause by the total number of tires made from the indicated elastomer and tested. The expected life of each tire (to a smooth tread) was calculated from the tread wear at the time of failure. The loss of mileage at time of removal was obtained by subtracting the mileage at failure from the expected life. The analysis of the test data follows:

	Frequency of Failures per 100 Tires		
	Neoprene	*Rubber*	*GR-S*
Ply Separation	1.7	1.9	5.5
Bruise Breaks	7.0	13.0	9.3
Fatigue Breaks	7.0	11.0	9.3
Blowout *	1.7	0.0	1.8
Total	17.4	25.9	25.9

	Average % Loss of Mileage in Tires Removed for Each Cause		
	Neoprene	*Rubber*	*GR-S*
Ply Separation	26	40	21
Bruise Breaks	26	38	57
Fatigue Breaks	44	45	46
Blowout *	67	0	19

	% of the Total Mileage of All Tires Tested Lost for Each Cause		
	Neoprene	*Rubber*	*GR-S*
Ply Separation	.5	.7	1.2
Bruise Breaks	1.8	5.0	5.3
Fatigue Breaks	3.1	5.0	4.3
Blowout *	1.2	0.0	.4
Total	6.6	10.7	11.2

* Probably the result of one of the other three causes.

Resistance to Cracking and Cutting

The use of neoprene for treads is suggested by its superior resistance to cracking, cutting and chipping. The following analysis of data obtained on 300 tires (6.00-16, 4-ply) run throughout the country on a fleet of light trucks illustrates the value of neoprene in this respect:

	Average % Loss of Mileage in Tires Removed for Each Cause		
	Neoprene	*Rubber*	*GR-S*
Cracking	0	31	33
Cutting	29	36	39

	% of the Total Mileage of All Tires Tested Lost for Each Cause		
	Neoprene	*Rubber*	*GR-S*
Cracking	0	2.3	1.8
Cutting	1.5	2.6	5.0
Total	1.5	4.9	6.8

The treads used on these tires were not specially compounded for cut resistance. Such special compounds have been tested in off-the-road service (coal strip mines and gravel pits) and have likewise performed better than natural rubber treads designed for this type of service.

Special Tire Design

Improved tread designs in which rubber is inadequate can be used for neoprene because of its superior cut and crack resistance. In fact, it is in such designs that the greatest value can be obtained. For example, the under-tread may be practically eliminated without promoting channel cracking, thereby reducing cost and producing a cooler running tire. Furthermore, the heat build-up of a properly compounded neoprene tread is lower than that of a natural rubber tread as indicated by the following data:

Temperature Rise in °C. of Tread Stocks Tested on the Goodrich Flexometer for 20 minutes with a ⅛" Stroke

Type of Elastomer	*Volumes of Black per 100 Volumes of Elastomer*	*°C. Rise in Temperature*
Neoprene	25	26
Natural Ruber	26	32
GR-S	22	50

These factors (crack and cut resistance and low heat build-up) suggest the use of a deeper tread design for "start and stop" tires. The safety of such tires is enhanced by the fact that neoprene resists skidding on wet pavements more than natural rubber.

A number of cab companies in eastern cities have equipped their cabs with 4-ply cotton neoprene tires having a special non-skid tread design. The design features of these tires embrace a very thin under-tread with a greater than normal skid depth and circumferential and cross cuts in place of a conventional molded pattern. The design is not suitable for rubber or GR-S as demonstrated by the following test car results on tires cured in the same mold:

	Miles to Failure	*Cause*
GR-S Tread	5,000	Tread Cracks
Natural Rubber Tread	14,600	Tread Cracks
Neoprene Tread	(Running at 33,417)	(None)

The practical advantage of this specially designed 4-ply cotton tire over a standard design GR-S tire is shown by the following information recently obtained from two of the cab companies:

Type of Tire	*Mileage Before Retreading*	*Carcass Failures*
GR-S, 6-ply (Standard Design)	12,000-15,000	Frequent *
Neoprene, 4-ply (Special Design)	21,000-24,000	Almost none

* One of the companies reports that 4-ply natural rubber or GR-S tires had never been satisfactory.

Fig. 3 shows graphically the relative performance of this special 4-ply neoprene tire and a standard 4-ply GR-S tire run under controlled test conditions.

Little Change in Processing Methods

The fabrication of neoprene tires involves little change in standard manufacturing procedures. Excessively high temperature processing of the stock, failure to remove all the air between the tread and carcass and the presence of unevaporated solvent were responsible for considerable tread separation. The correction of these practices has now practically eliminated this cause of failure.

One of the most important fundamental differences between neoprene and other elastomers is the fact that neoprene, particularly in the presence of carbon black, will cure without the addition of curing agents or accelerators. Therefore, the temperature of processing must be kept within certain limits. However, these limits are not impractical as indicated by the fact that manufacturers who have learned how to process neoprene and use it in volume experience little processing trouble and their processing cost is as low or lower than with other elastomers.

Summary

It has been demonstrated that a limited improvement in quality can be made by the use of neoprene for part or all of the elastomer in a passenger car tire of conventional design. It has been further demonstrated that the greatest advantage is obtained by designing a tire around the properties of the neoprene. The use of neoprene sidewalls or sidewall veneers offers an easy method of improving tire quality and appearance at little or no additional cost. The practicability of neoprene processing is best proved by the success of manufacturers using it in regular production.

The fact that no appreciable amount of development work on combinations of neoprene and other elastomers is reported does not exclude the possibility of successful development along this line. Furthermore, the possibility of modifying existing polymers to improve one or more characteristics is always present. Future experimentation with tire design will no doubt show more clearly the characteristics to which attention should be directed.

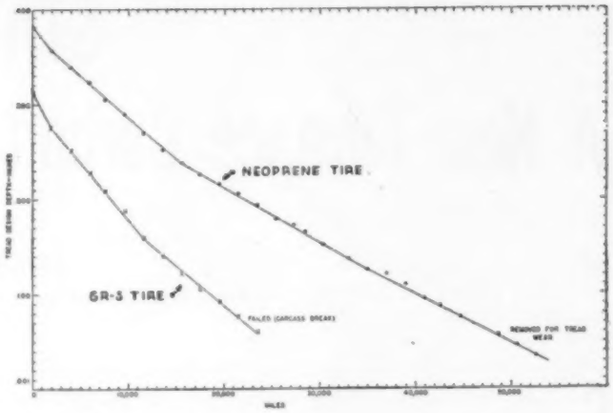
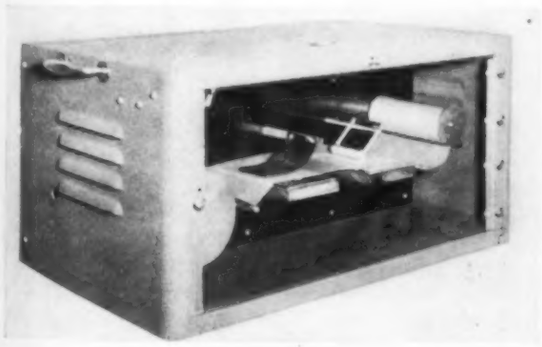


FIG. 3—Tread wear comparison of neoprene tire with special tread design (•) versus GR-S tire with conventional tread design (x). Test car operated at 60 miles per hour at San Antonio, Texas.

G-E Flaw Detector for Thin Materials

A NEW flaw detector which finds and counts holes, weak spots, and conducting paths in thin materials has been introduced by the Special Products Division of the General Electric Co., Schenectady, N. Y. The device may be used to test sheet rubber, paper, sheet mica, varnished cloth, plastic materials, and enamel films on wire during the manufacturing process. The new instrument is said to permit quality standards to be set up close to the point of manufacture so that variations in quality can be quickly detected and correcting adjustments made with a minimum of waste. Applications include detecting places of low dielectric strength in insulating materials, and holes in materials which must resist the passage of light or air.



Electrode unit showing two types of electrodes for G-E Flaw Detector.

The new flaw detector can be applied to sheet materials up to .025-inch thick moving as fast as 450 feet per minute and to wire moving up to 100 feet per minute. It consists of an electrode assembly through which an adjustable voltage is applied to the material undergoing test, and an electronic circuit which indicates the flow of current through the material which occurs when a flaw passes under the electrode. Electrodes have been especially designed for use with specific materials.

The new instrument can be made to sound an alarm, operate a recorder, or shut down the manufacturing process when flaws are encountered, and can be arranged to indicate when flaws exceed a given total. The control unit may be mounted remotely, where an operator can read the counter or watch for flashes of a flaw-indicating red light.

STATEX K

A New Furnace Carbon of Channel Black Quality

By REID L. CARR

President, Columbian Carbon Co., New York 17, N. Y.

CULMINATING a long range research program, it is now possible to announce the commercial development of a new furnace carbon known as Statex K which has been shown to equal or surpass standard channel black in road wear, both in synthetic and natural rubber tires. Over a million pounds of the new product have been marketed to the rubber industry at a premium price over that prevailing for channel black.

Because of the enormously increased consumption of natural gas for domestic and industrial purposes, its availability for the production of carbon black has recently shown marked deterioration. Statex K is produced by a new patented furnace process which operates at over twice the efficiency of the existing channel method. The eventual replacement of the channel process by this more efficient one represents a major contribution to the national economy. For example, the potential saving in natural gas for the year 1945 would have more than supplied the Big Inch.

History of Carbon Black

The first carbon plant was built in 1872 by Howorth & Lamb in New Cumberland, West Virginia. Luminous flames of natural gas were burned under large soapstone slabs which were then scraped off. From this small beginning, carbon black has become a major industry and during the recent war played a critical role. Without carbon black, synthetic rubber could not have been used to save our military and industrial transport system. The following figures will be of interest:

	Annual Production of Carbon Black
1905	11,000,000 lbs.
1925	177,000,000 lbs.
1945	1,052,000,000 lbs.
1946	1,237,000,000 lbs.

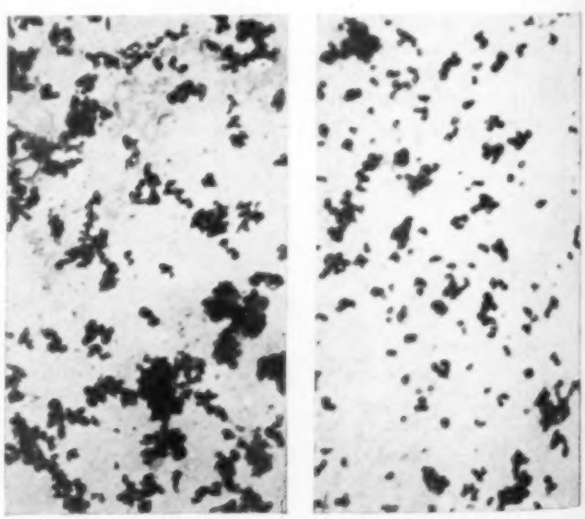
Natural gas, the raw material for the carbon black industry, is one of the unique natural resources of our country. Everyone knows how it has become invaluable, not only as a domestic fuel but also for industrial and chemical operations. Pipelines now carry natural gas to many localities throughout the land. The following table shows the growth of the industry and its present astronomical dimensions. The units are not cubic feet but millions of cubic feet:

	Natural Gas Produced in Millions of Cu. Ft.
1905	260,000
1925	1,188,000
1945	3,845,000
1946	4,900,000

Natural gas contains upwards of 30 lbs. of carbon in each 1,000 cu. ft. By the so-called channel or impingement process of manufacture, less than 5% of this carbon is recovered in the form of carbon black, the material superior to all others for the strengthening or reinforcement of rubber goods. Naturally, therefore, throughout the 75 year history of the carbon black industry, there have been many attempts to improve the efficiency of the process. For example, 600 patents have been taken out, in the U. S. Patent Office alone, for the improvement of carbon black processes.

Beginning in 1922, furnaces were developed in which flames of natural gas were burned and the smoke collected in bags (the Matlock Process of Columbian Carbon Co.). Other furnaces were developed which contained heated refractory through which natural gas was passed in order to decompose it into carbon, likewise bag collected (Thermatomic Process). By these furnace processes, the efficiency was raised from less than 5% to upwards of 25%, a five times improvement. However, the products obtained were far inferior to the standard impingement or channel product. They were useful in rubber compounding but could not be used to make tire treads. Thus in 1925 out of a total production of 177,000,000 lbs. less than 33,000,000 lbs. were produced by furnace processes.

The carbon black industry, always a migrant one,



Statex K Micronex W-6

15000X (app.)

Comparison of structure persistence after high viscosity mixing.

Typical channel black plant at Sunray, Texas

today finds itself confronted by an impasse. The requirements of natural gas for domestic and industrial purposes have finally reached the point where both on the score of supply and of cost, it is no longer possible to expand channel black production to keep in step with the demands of the rubber industry.

In anticipation of this Columbian Carbon had launched, under the direction of W. B. Wiegand, a research program costing several millions of dollars, and directed squarely to the problem of replacing the channel process by a more efficient one, without sacrifice in the quality of the product.

The advent of war necessitated a temporary change in objective. The demands placed on the carbon black industry by the substitution of synthetic rubber for the natural product resulted in an enormous expansion of furnace carbon production. The quality of furnace carbons was improved to a point where they were able to mitigate the defects of synthetic rubber for tires and other war products. The 1945 production of furnace carbons was about 500,000,000 lbs. or one-half of the total. But there still remained the problem of producing on a commercial scale, a furnace carbon fully equal to channel black for use in tire treads.

Research for Statex K

As invariably happens in the course of long-term fundamental research, valuable by-products appeared. Early in the program it was evident that existing knowledge of carbon black did not provide accurate measuring sticks for the assessment of forward progress. Three contributions from Columbian laboratories supplied these so-called "Building Stones," as follows:

A. *pH, the Criterion of Purity:* Channel black contains chemically combined oxygen which gives an acidic nature to the material. Research towards the elimination of this deleterious oxygen was greatly facilitated through the development of the pH criterion by Columbian. The results were made universally available by means of a paper read June 28, 1937, to the International Rubber Congress in Paris *(1)*. pH has now become a fundamental chemical criterion in carbon black technology.

B. *The Electron Microscope and Specific Surface:* In the year 1940 *(2)*, Columbian Carbon Company applied the newly developed electron microscope for the accurate determination of the particle size and shape of channel black. This discovery made possible for the first time the accurate measurement of the underlying factors responsible for carbon black reinforcement of rubber.

C. *"Structure":* In 1941, again through the use of the electron microscope, the third building stone was announced *(3)*. It was found that reticulate chain structure played a significant part in the behavior of carbon blacks in natural rubber and particularly in synthetic rubber. Hitherto unexplained peculiarities in the behavior of carbon black were now clarified and made susceptible of quantitative measurement.

Production of Statex K

Statex K is made by a radically new and different process. By the existing impingement or channel process, enormous numbers of lazy, yellow flames similar to illuminating gas flames are allowed to play upon slowly moving iron surfaces or channels, which are periodically scraped. Special precautions are taken to minimize flicker or turbulence of the flames.

In existing furnace processes there was likewise provision for flames kept carefully intact, and burning quietly within their envelopes of secondary air.

The preferred Statex K process (U. S. Patent No. 2,378,055) flies in the face of all this. A roaring inferno of blast gases is the first step. Confined within furnace walls these reach white heat (upwards of 2400° F.). Then into this swirling, violently turbulent mass of incandescent gases there are forced jets of hydrocarbon "make" gas also at high velocity. When these two streams meet, one incandescent, the other relatively cold, they are quickly intermingled, the hydrocarbon "make" jets are shattered, heat is almost instantaneously transferred from the hot gases to the "make" gas, and within a fraction of a second the particles of Statex K are born.

The reaction conditions are under precise control—blast gas, blast air, make gas, temperature and condition of furnace atmosphere. The result is that particle size, structure, and surface activity are all predeter-

(Continued on page 73)

Statex K plant at Hickok, Kansas.

Resurfacing Freeze Rolls by Metal Spraying Method

AS A RULE, the reclamation of large pieces of equipment, or the repair of such equipment, by the use of metal spraying equipment is accomplished in the shops of companies specializing in the spraying of corrosion-resistant coatings. In many cases, however, it is not practical to move the equipment to be repaired from its location to the repair shops, and modern methods have made it possible to bring the repair shop, or at least the repair equipment, to the manufacturing site.

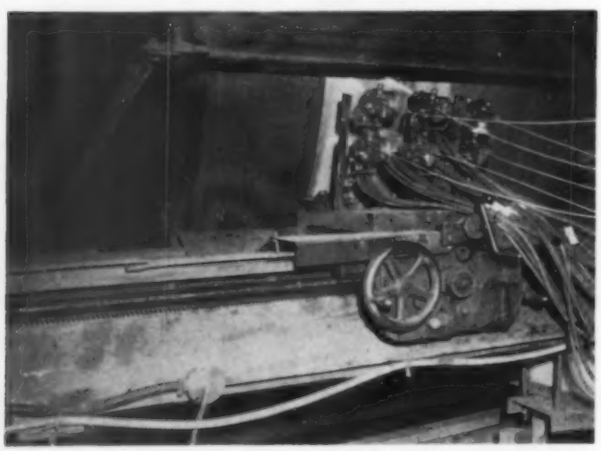
This method was recently utilized by the Thornton Company, of Cleveland, Ohio, in connection with the repair of a freeze roll in one of the large synthetic rubber plants. The problem was to apply a coating of Metcoloy No. 1, 3/16ths of an inch thick on the radius to a freeze roll 9 feet in diameter and 9 feet long. Due to the size and weight, removal of the roll from its permanent position would have been a very lengthy and costly procedure.

The job was handled in this manner: First, a special lathe was constructed as well as a special grinder with which to finish the coating after spraying. Both were constructed so as to be mountable on the framework of the machine of which the roll was a part. Because of the presence of volatile fumes throughout the plant, the roll was housed in by constructing a wooden structure which totally enclosed the roll and the lathe attachments. This temporary structure was covered with roofing paper, and two large vents from the plant ventilating system were built in so that fresh air under pressure was circulated during the entire metallizing and finishing operation.

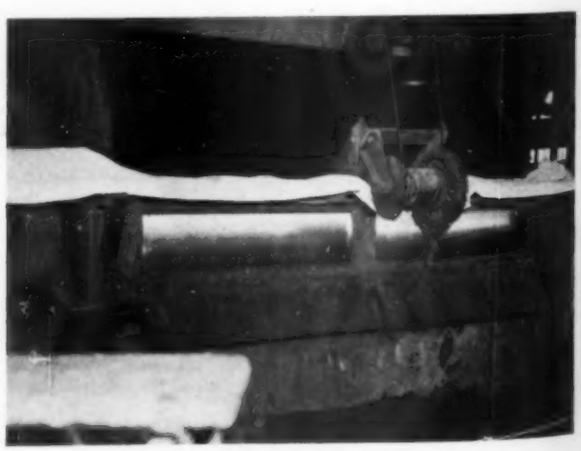
It was necessary to have the surface perfectly true, so before starting the metallizing operation a light cut was taken clear across. Two tools and six Metco Type 2E Guns were then mounted on the lathe carriage (as can be seen in the lower left photo). The first tool was set to cut a rough, tearing thread, and the second to remove loose slivers and ragged projections. The guns applied the entire thickness (3/16" on the radius) in one pass, so that both preparation and metallizing were done simultaneously in one pass across.

This two gun mounting illustrates the method of setting tools for preparation and metallizing in a single operation.

Two crews of two men each handled the entire job. Approximately 2,000 pounds of Metcoloy No. 1 was applied, and when the spraying was completed the grinder was mounted and an excellent finish obtained (as indicated in the lower right photo). Only four days were required for the entire job. The Metco guns and Metcoloy metal spray are products of the Metallizing Engineering Co., Inc., of Long Island City, N. Y.



Method of mounting two tools and six Metco guns on the lathe carriage to repair freeze roll.



Surface of freeze roll after finish grinding. Note method of mounting the grinder.

High Polymer Forum Features A. C. S. Atlantic City Meeting

ONE of the major features of the 111th Meeting of the American Chemical Society, scheduled to be held in Atlantic City, N. J., from April 14 to 18, 1947, is another of the High Polymer Forums. These Forums, introduced a few meetings back, have proved most popular and attract an appreciative audience each time. The Forum at the Atlantic City meeting, which features a Symposium on Thermodynamics of Polymer Solutions, is sponsored by the Division of Rubber Chemistry jointly with the Divisions of Cellulose; Colloid; Organic; Paint, Varnish and Plastics; and Physical and Inorganic Chemistry.

The Atlantic City Forum will include 18 technical papers. It will consist of three sessions, one on Monday afternoon, April 14, and one each on the morning and afternoon of Tuesday, April 15. P. Debye, Maurice L. Huggins and H. I. Cramer will preside at the various sessions. Dr. Cramer is also acting as chairman of the Forum. Abstracts of all of the papers scheduled for presentation follow herewith:

ABSTRACTS

Phase Equilibria in the System: I. Polymer-Solvent-Precipitant. II. Polymer-Polymer-Solvent. *Robert L. Scott (University of California).*

I. *Polymer-Solvent-Precipitant:* Previous treatments of equilibria in three component systems of polymer and two liquids usually involved transformation to an equivalent binary mixture of polymer with a hypothetical single liquid of average properties. Provided the heat of mixing has a simple form analogous to the common two component equations of Hildebrand, Scatchard and van Laar, this "single liquid" treatment can always be used for one-phase systems. Its use for two-phase systems requires the unlikely assumption that the proportion of solvent to precipitant is the same in both phases. Phase diagrams have been calculated for a number of systems, using the usual free energy equations of Flory and Huggins. Comparison with the "single liquid" treatment shows that this approximation is useless except for crude qualitative considerations. The position of the phase boundary is nearly independent of molecular weight of the polymer for molecular weights much above 10,000. A polymer is completely soluble in a certain mixture of two non-solvents if its internal pressure lies between those of the two liquids, and the two liquids are themselves completely miscible. Analytical expressions for the plait points of such ternary systems are derived.

II. *Polymer-Polymer-Solvent:* The same thermodynamic analysis used in the previous treatment of the system: polymer-solvent-precipitant is applied to a ternary system of two polymers and one solvent. In the absence of a solvent, two different polymers are always immiscible with each other unless the heat of mixing is virtually zero or negative. In the three component system, the two phase region may persist at very low concentrations of polymer. In most cases, the primary role of the solvent is that of dilution, reducing the heat of mixing of the two polymers. The exact nature of the solvent is of only secondary importance, provided that it is a "good" solvent for both polymers. This agrees with the experimental results of Mmes. Dobrey and Boyer-Kawencki (*J. Polymer Science,* December, 1946) who report incompatibility of different polymers in a good solvent at concentrations of polymer as low as 1%.

Phase Equilibria in Solutions of Mixed Polymers. *W. H. Stockmayer and H. E. Stanley, (Department of Chemistry, Massachusetts Institute of Technology, Cambridge, Mass.).*

The tendency toward incompatibility of two different polymers persists in dilute solutions, often causing separation into two phases at concentrations of the order of one percent. We have used the Flory-Huggins theory of polymer solutions to explore certain features of this behavior.

Analytical treatment is feasible for a very special case: two monodisperse polymers with equal molecular weights and equal interactions (μ-values) with the solvent. Here the critical phase has a polymer concentration inversely proportional to the molecular weight and to the μ-value describing the polymer-polymer interaction. As the concentration is increased, segregation of the two polymers into separate phases is very rapid, being within one percent of completion at little more than twice the critical concentration.

The effect of polydispersity was investigated for this special case: the critical composition depends on the *weight average* size; however, the presence of small molecules, as expected, reduces the tendency for segregation considerably.

Numerical calculations for several less specialized systems (i.e., unequal molecular weights and interaction constants) were also made. The results support the suggestion that analysis of the phases at equilibrium affords an easy and useful relative method of measuring molecular weights or interaction constants. Our calculations indicate the limitations and errors involved.

The Sedimentation and Diffusion Constants of Polymers. *P. Debye and A. M. Bueche (Cornell University, Ithaca, N. Y.).* (Note: This investigation was carried out under the sponsorship of the Office of Rubber Reserve, RFC.)

Expressions for the sedimentation and diffusion constants of coiling polymers have been developed by a method similar to that used for the calculation of intrinsic viscosity [Debye, *J. Chem. Phys.,* Vol. 14, p. 636 (1946); *Bulletin A.P.S.,* Vol. 22, p. 33 (1947), Reports to Office of Rubber Reserve]. The method takes into account the effects on the liquid flow around a group in the molecule of the disturbances caused by all the other groups.

It is shown that these constants are not measures of molecular weight alone but depend primarily upon the extent of coiling of the molecule and the friction coefficients for the groups in the molecule. Stokes' form of the molecular friction coefficient is found to be a limiting case for very compactly coiled polymers.

The usual exponential representation of the dependence of these constants on molecular weight is shown to be a good approximation for limited molecular weight ranges. Actually the exponent depends on the type of molecule and is a function of the molecular weight. Convenient expressions can be written so that existing data expressed in this way may be translated into values for an average radius of the space occupied by the molecules and for a so-called shielding ratio expressing the amount of screening of the interior parts of the molecule from the flow of the solvent along the outside.

The discussion can be extended to include branched and cross-linked polymers. Here the exponent again depends on the molecular weight but the limiting values for small and large molecular weights are different. It will probably be possible from measurements of viscosity and diffusion or sedimentation in combination with measurements of the size derived from the dissymmetry of light scattering to estimate the amount of cross-linking or branching.

Intrinsic Viscosity-Molecular Weight Relationships for GR-S and Polystyrene. *R. H. Ewart and H. C. Tingey (General Laboratories, U. S. Rubber Co., Passaic, N. J.).*

A very careful fractionation of GR-S has been carried out. This was followed by the determination of the intrinsic viscosities and the osmotic molecular weights of the fractions. These results are in substantial agreement with earlier measurements by French and Ewart. A similar investigation was made of polystyrene fractions. The polystyrene was also prepared by emulsion polymerization. In this case, both benzene and butanone were used for viscosity measurements. A smaller exponent was found in the general relationship:

$$[\eta] = KM^{a}$$

for the poorer solvent, butanone. This is in agreement with the recent theory of polymer solution viscosity by P. Debye.

An equation is given expressing the intrinsic viscosity of unfractionated polystyrene in terms of its number average molecular weight. These results were obtained on polystyrene samples having a wide range of average molecular weights, but prepared in such a way as to have the same simple distribution of molecular weights. Hence this last equation should only be used on similar samples of unfractionated material.

The intrinsic viscosities, $[\eta]$, at 30°C. of these systems as a function of molecular weight are given by the following:

Polymer	*Solvent for Viscosity*		*Relationship*
GR-S Fractions	Benzene	$[\eta] = (4.91 \times 10\text{-}4)$	$M^{0.67}$
Polystyrene Fractions	Benzene	$[\eta] = (0.97 \times 10\text{-}4)$	$M^{0.74}$
	Butanone	$[\eta] = (3.06 \times 10\text{-}4)$	$M^{0.60}$
Unfractionated Polystyrene	Benzene	$[\eta] = (0.75 \times 10\text{-}4)$	$M_{\eta}^{0.783}$

Compositional Heterogeneity Of Copolymers And Its Effect On Viscosity And Fractionation Studies. *D. B. MacLean, Maurice Morton and R. V. V. Nicholls (Division of Organic Chemistry, McGill University, Montreal, Canada).*

The GR-S system is used to illustrate a unique method of determining the effect of compositional changes in a copolymer chain on the viscosity and solubility of the copolymer. It is generally known that in most copolymerizations the co-monomer ratio in the polymer chain will change continuously during the reaction. This phenomenon has been observed in the GR-S system. Such changes may, to a greater or lesser extent, obscure desired information concerning molecular size, as obtained by viscosity or fractionation studies.

In this work a technique was devised whereby relatively homogeneous polymers were prepared, having the same molecular weight or degree of polymerization, but with variable butadiene-styrene contents. This technique eliminates the variable of chain-length and permits a demonstration of the effect of polymer composition.

For a given degree of polymerization the effect of increased styrene content in the chain is to increase the solubility of the polymer in a given benzene-methanol mixture. Thus, in the system under study, the peak in the precipitation distribution curve shifted from 18 volume percent methanol for polybutadiene to 25 volume percent methanol for polystyrene. The significance of this solubility change can be appreciated when it is considered that standard GR-S polymer is almost completely precipitated in the range of 17 to 27 volume percent methanol.

For a given degree of polymerization an increase in styrene content generally leads to a decrease in the intrinsic viscosity of the polymer. This result is to be expected from a consideration of the effect of styrene content upon chain length. In the case of polystyrene, however, an anomalous slight increase in viscosity was observed. Although no reliable explanation can be presented, it is considered probable that this increase may be due to the absence of branched chains in the linear polystyrene molecules.

Viscosity-Molecular Weight And Viscosity-Temperature Relationships For Polystyrene And Polyisobutylene. *Thomas G. Fox, Jr., and Paul J. Flory (Goodyear Research Laboratory, Akron, Ohio).* (Project sponsored by the Office of Naval Research.)

Melt viscosities of fractionated samples of polystyrene and polyisobutylene ranging from about 5,000 to over 100,000 molecular weight have been measured at various temperatures. The logarithm of the melt viscosity at constant temperature is a linear function of the square root of the molecular weight in each case, except at low molecular weights.

Plots of log viscosity vs. the reciprocal of the absolute temperature are non-linear, the slopes increasing with decreasing temperature. The apparent activation energies for viscous flow computed from the slopes, $d(\log\eta)/d(1/T)$, of these plots increase with decreasing temperature: for polystyrene from 22 kcal at 217° to 37 kcal at 176° C., and for polyisobutylene from 10.5 kcal at 217° to 13.0 kcal at 125° C. Viscosity-temperature coefficients are independent of molecular weight for polyisobutylene, i.e., $\log\eta$ vs. $1/T$ curves for various samples are parallel within experimental error. In the case of polystyrene, however, such curves are accurately parallel only for molecular weights above about 20,000; viscosity-temperature coefficients decrease with molecular weight below this limit.

X-Ray Diffraction Studies Of Some Synthetic Rubbers At Low Temperatures. *E. E. Hanson and G. Halverson (Chemical and Physical Research Laboratories, Firestone Tire & Rubber Co., Akron, Ohio).*

A low temperature technique is described for obtaining X-ray diffraction diagrams of stretched raw polymers. Relaxation of the specimen is prevented during the X-ray exposure by maintaining the sample at a temperature of —70° C. In many cases polymers which failed to show fibering when stretched at room temperature did show fibering when stretched at a lower temperature.

Emulsion polybutadiene gives a fiber pattern with two reflections on the meridian. Interpretation of these orders as 2 and 4 gave an identity period of 4.53 A.U. corresponding to the trans structure. Equatorial arcs were observed at 4.12, 3.47 and 2.20 A. U.

Sodium polybutadiene showed only a single pair of equatorial arcs at 5.75 A.U. The absence of a meridian pattern is indicative of the lack of regularity along the chain.

Sodium and emulsion polymerized polyisoprene gave only equatorial arcs at 6.46 and 4.85 A.U., respectively. In both the polybutadienes and the polyisoprenes the side spacing given by the equatorial arcs were consistent with the percentages of 1,4 addition as determined by the perbenzoic acid oxidation method.

Emulsion polydimethylbutadiene showed a set of 3 spacings on the meridian and of one on the equator. An interpretation of the diagram is being made.

Thermodynamics Of Crystallization In High Polymers. I. Crystallization Induced By Stretching. *Paul J. Flory (Goodyear Research Laboratory, Akron, Ohio).* (Project sponsored by the Office of Naval Research.)

A theory of oriented crystallization in elongated polymers having network structures (e.g., in vulcanized rubber) has been developed through the application of statistical mechanical procedures similar to those employed in rubber elasticity theory. Expressions have been derived which, within the limitation imposed by the simplifying assumptions, relate the incipient crystallization temperature with the elongation, the degree of crystallinity with the elongation and temperature, and the re-

tractive force at crystallization equilibrium with the elongation at constant temperature.

The reciprocal of the absolute temperature for incipient crystallization is predicted to decrease linearly with a simple function of the elongation and the average number of chain segments between cross-linkages. Only moderate degrees of crystallinity are predicted at equilibrium. In conformity with requirements of the second law of thermodynamics, equilibrium crystallization decreases the tension in the stretched specimen according to the present theory.

Apparent discrepancies between some of these predictions and various observations arise owing to severe departure from equilibrium crystallization when the polymer undergoes crystallization *during* the stretching process. A better approach to equilibrium should be achieved by stretching under conditions which prevent crystallization (e.g., at elevated temperature), then allowing crystallization to proceed at fixed elongation. Few experiments have been performed in this manner, but such results as are available confirm qualitatively the predictions of the theory.

Reasons for the rapid increase in tension which is observed when crystallization occurs during ordinary stretching of rubber will be discussed. Crystalline and amorphous regions preferably should not be regarded as separate phases. Likewise, the conversion of amorphous to crystalline polymer does not conform to the definition of a phase transition.

An Investigation Of The Structure Of Polymers By Birefringence Studies. *R. S. Stein and A. V. Tobolsky (Princeton University, Princeton, N. J.).*

The stress of a polymer held at a definite extension is related to both the internal energy and entropy of the polymer configuration. The birefringence of a solid polymer, on the other hand, is a configurational property—dependent only upon the disposition of molecules in the solid state and independent of the forces between them.

Polymers are classified into *ideal* rubbers where the stress is entropy determined and $\left(\frac{\delta E}{\delta e}\right)_T = 0$ for constant volume distortions; *regular* rubbers where the stress is determined by both entropy and energy but the molecular configuration (entropy) is not affected by the energy interactions; and *non-ideal polymers* where both energy and entropy affect stress and each other.

For ideal rubbery polymers, the ratio of stress to birefringence varies linearly with temperature and is expected to be independent of time for relaxations involving a single molecular process. For regular rubbers, greater temperature dependencies are to be expected, and the ratio of stress to birefringence varies with time, approaching a constant value with time. The deviations may be directly interpreted as variation of internal energy with configurational changes. For non-ideal polymers, similar deviations are found but must be ascribed to both energy and entropy.

By measurements of strain and birefringence as a function of strain, temperature, time and molecular structure, one may explore aspects of the symbolic equation:

$$\begin{array}{ccccc} \text{Entropy} & + & \text{Internal Energy} & \rightleftharpoons & \text{Free Energy} \\ \uparrow\downarrow & & & & \downarrow\uparrow \\ \text{Distribution Function} & & & & \text{Stress} \\ \uparrow\downarrow & & & & \\ \text{Birefringence} & & & & \end{array}$$

An apparatus for the simultaneous measurement of stress and birefringence as a function of strain, temperature, and time is described.

Experimental examples of several ideal rubbers is presented (polysulfide rubber, Hevea gum vulcanizate, and cast sheets of Hevea latex). It is shown that ideal stress-birefringence behavior is observed irrespective of the detailed relaxation mechanism (chemical or physical). A non-ideal case is illustrated and the application of the method to the study of internal transitions separating regions of stress behavior governed by entropy and energy is demonstrated.

Effects Of Cross-Linking And Branching On The Molecular Constitution of Diene Polymers. *Paul J. Flory (Goodyear Research Laboratory, Akron, Ohio).*

Diene polymerizations usually are complicated by cross-linking reactions. These are believed to originate from occasional addition of the free radical terminus of a growing chain to an unsaturated carbon atom of a diene unit belonging to a previously formed polymer molecule. A kinetic treatment of this process indicates the manner in which the concentration of cross linkages in the polymer increases with conversion. A rate of free radical addition to a previously polymerized unit relative to its rate of addition to monomer can be deduced from the average chain length and the conversion at which gel first appears.

Cross linkages introduced by the mechanism under consideration are not distributed at random, but the deviations from a random distribution are unimportant except at high conversions. Under certain conditions the cross-linking reaction may decrease the total number of molecules more rapidly than they are formed.

Physical properties of polymers (with particular emphasis on vulcanized rubbers) are most conveniently interpreted in terms of (1) the primary molecular weight (i.e., molecular weight in the absence of cross linkages) and its distribution, and (2) the concentration of cross linkages. The actual molecular weight distribution, which may be severely distorted by the presence of cross linkages, is inappropriate for direct correlation with the more important physical properties. The modifiers commonly employed in diene polymerization offset the effects of (2) at a sacrifice in (1).

Branching may result from chain transfer with a previously formed polymer molecule. Such processes, which are incapable of leading to network formation, should be clearly differentiated from cross-linking reactions.

Chemo-Rheology Of Polysulfide Rubbers. *Marcos Mochulsky and Arthur V. Tobolsky (Princeton University, Princeton, N. J.).*

The cold flow in polysulfide rubbers is shown to be due to chemical exchange reactions between bonds in adjacent polymer chains. The exchange between terminal mercaptans and disulfide or polysulfide linkages is particularly rapid. The rate of stress relaxation is accelerated several hundredfold by incorporation of a few tenths of a percent of mercaptan to the rubbers. Addition of elemental sulfur or exposure to ultraviolet light also accelerate the rate of stress relaxation. Certain chemical agents which may either act as mercaptan or possibly free radical terminators are shown to decrease the rate of cold flow.

Copolymerization Equilibrium. *Turner Alfrey, Jr. (Polytechnic Institute of Brooklyn, Brooklyn, N. Y.) and Fred Leonard and Arthur V. Tobolsky (Princeton University, Princeton, N. J.).*

It is suggested that at sufficiently high temperatures, equilibrium polymerization-depolymerization will govern copolymer structure and composition as well as molecular weight distribution. It should, therefore, be possible to produce "equilibrium copolymers" by heating together at sufficiently high temperatures (a) a mixture of the two monomers, (b) a mechanical mixture of the two polymers, (c) a mixture of one monomer and another polymer, (d) a copolymer of the two monomers.

It of course must be realized that except for certain favorable polymers, side reactions such as chain transfer and splitting off of products such as HCl will complicate the simple picture described above. Furthermore, fairly low molecular weight materials are to be expected at these elevated temperatures.

For the simple case where only linear polymerization and depolymerization are involved, statistical-thermodynamic treatments were carried out which give the "equilibrium copolymer" structure in terms of the bond energies and entropies. Experimental evidence for the formation of copolymers by these methods has been obtained, but probably complete equilibrium was not achieved.

Polyamide Resins From Dilinoleic Acid And Ethylene Diamine. Molecular Weight-Viscosity Relationships. *D. H. Wheeler (General Mills, Inc.) and Raymond Anderson (University of Minnesota).*

Polyamides have been prepared from purified dilinoleic acid and ethylene diamine, with molecular weights from 2,200 to 12,000. Certain properties are reported. Solution viscosities were determined in 1-1 n-butanol-toluene at concentrations from 0.2 to 9.8 g. per 100 cc. Up to at least 1.5% $\ln\eta_r$ is directly proportional to concentration. Intrinsic viscosities were determined from the slope of the $\ln\eta_r$ vs. c lines. From 2,000 to at least 10,000, the relationship of $[\eta]$ to molecular weight is expressed by

$$[\eta] = 0.0755 + 1.25 \times 10^{-5} M.$$

which is similar to the relationship found by Flory for polyester solutions. The existence of this relationship means that the ratio of weight average (M_w) to number average (M_n) molecular weight is constant in the polymers as prepared. The molecular weight of a mixture of polymers determined from the $[\eta]$ agrees well with the calculated M_w of the mixture, but not with the M_n of the mixture. This fact also indicates a constant ratio of M_w to M_n in the polymers as prepared.

Effect Of Emulsifiers And pH In The Emulsion Polymerization of Styrene. *Gilbert E. Moos and Ernest P. Irany (Plastics Division, Celanese Corporation of America, Newark, N. J.).*

A series of emulsion polymerizations of styrene were carried out in sealed glass ampoules which were rotated four hours at 60° C. in a water thermostat. Five-gram samples of styrene were used in standardized compositions including 0.7% hydrogen peroxide (styrene basis) and 7.5 grams water. The series included nineteen emulsifiers, four concentrations of each emulsifier, and five pH levels.

The emulsifiers investigated were Aerosol AY, Aerosol IB, Aerosol MA, Aerosol OT, Aerosol OS, cetyl dimethylamine, Duponol ME dry, nonaethylene gylcol monolaurate, nonaethylene glycol mono-oleate, Nopco 2149-A, sodium carboxymethyl cellulose, sodium oleate, sodium stearate, Span 20, Span 80, Triton K-60, Triton NE, Tween 20, and Tween 80. The emulsifier concentrations were 0.25, 0.5, 1.0, 2.0, and 5.0% (styrene basis)—the first four concentrations being used for Aerosol OT, the last four concentrations being used for all of the other emulsifiers. The pH was adjusted by adding either NaOH or HCl. Two or three emulsifiers (40 or 60 experiments) were conducted at the same time to effect optimum uniformity.

Plotted polymer yield data show the superiority of cetyl dimethylamine over all of the other emulsifiers examined. Sulfated and sulfonated emulsifiers were next in order of effectiveness. Sodium oleate proved to be very active, and much more active than sodium stearate. The specific importance of pH indicates that it must be thoroughly investigated before deciding the superiority of one emulsifier over another. Cetyl dimethylamine and the sulfates and sulfonates prove to be most active when slightly acidified whereas the soaps become most active when slightly basified. Yields are directly proportional to emulsifier concentration.

Certain Ingredients Of Soaps As Retarders Of The Copolymerization Of Butadiene And Styrene. *J. W. Wilson (Union Oil Co., Oleum, Calif.) and E. S. Pfau (B. F. Goodrich Co., Akron, Ohio).*

Linoleic and linolenic acids are retarders of the rate of copolymerization of butadiene and styrene in the GR-S recipe. The replacement of up to 10% of sodium palmitate emulsifier by sodium linoleate resulted in a reduction of the conversion obtained in 12 hours of 1.4% for each percent of sodium palmitate replaced. Linolenic acid exerts approximately three times as great a retarding action as linoleic acid. No evidence was found for the presence in prime tallow, No. 1 tallow or yellow grease of substances inhibiting or retarding the emulsion copolymerization of butadiene and styrene (GR-S recipe) other than linoleic or, if present, linolenic acid.

1,4-Pentadiene, which contains the same double bond structures as is present in linoleic acid, gave a retarding effect of the same magnitude as linoleic acid. Linoleic acid, isomerized to the conjugated acid, did not retard. Highly purified oleic, elaidic, stearic and palmitic acids when employed as emulsifying agents for the copolymerization of butadiene and styrene gave essentially identical hydrocarbon conversions in 12 hours. Hydrogenated soy bean oil soap (iodine value of 40 to 50) employed as the emulsifier resulted in a rate of polymerization equal to that obtained with highly purified fatty acid soaps

The Effect Of Meta And Para Substituents On The Reactivity of the Styrene Double Bond In Copolymerization. *Cheves Walling, Emorene R. Briggs, Katherine B. Wolfstirn and Frank R. Mayo (General Laboratories, U. S. Rubber Co., Passaic, N. J.).*

Earlier work has established that there is no simple order of activity of double bonds in copolymerization, but rather that reactivity depends upon the nature of the attacking radical as well. In an attempt to separate the factors involved, the reactivity of substituted styrenes has been investigated by copolymerization with two representative monomers, styrene and methyl methacrylate, with the results listed below:

	Relative Reactivity with Indicated Radical Type	
Substituent	*Styrene*	*Methacrylate*
p-OCH_3	.86	1.72
p-$N(CH_3)_2$	.98	2.44
p-CH_3	—	1.23
m-CH_3	—	.94
None	1.00	1.00
p-Cl	1.35	1.27
p-Br	1.44	1.27
p-I	1.61	1.39
m-Cl	1.56	1.06
m-Br	1.82	1.04
p-CN	3.57	2.27
p-NO_2	5.26	—

In reactions with the styrene radical, effects of substituents lie in the same order found for polar reactions (Hammett, "Physical Organic Chemistry," Ch. VII) with a rho value of .509. This is considered to indicate that in this reaction *m*- and *p*- substituents act by altering the electrostatic interaction between the approaching radical and the styrene double bond, and that the styrene type radical behaves as though it possessed a partial negative charge. Similar conclusions are indicated for the reaction of the methacrylate type radical with most of the substituted styrenes. However, p-CH_3-p-OCH_3- and p-$N(CH_3)_2$- styrenes show unexpectedly high reactivities. This reactivity is correlated with their high tendency to form molecular complexes with conjugated carbonyl systems (maleic anhydride, chloranil, etc.) and the resemblance between the postulated structures of these complexes [Wiess, *J. Chem. Soc.*, p. 245 (1942)] and certain resonance forms available in the activated complex of the polymerization is pointed out.

Vulcanization Of Rubber. I. Stoichiometry Of The Crosslinking Reaction. *Bernard C. Barton and Edwin J. Hart (General Laboratories, U. S. Rubber Co., Passaic, N. J.).*

It has been discovered that when the conditions of vulcanization are controlled so as to give the maximum yield of sulfur intermolecular cross-linkages, the vulcanizate produced has the unique characteristic of having one chemical crosslink per molecule of zinc sulfide formed. This fact has been demonstrated by application of the equations of Wall [*J. Chem. Phys.*, Vol. 10, pp. 132, 485 (1942)] and Flory [*Chem. Rev.*, Vol. 35, p. 51 (1944)] to equilibrium stress and sulfide sulfur data obtained on this vulcanizate. The important variables for contributing to the efficient utilization of sulfur in forming cross-links between rubber molecules will be discussed.

Farmer and Shipley [*J. Pol. Sci.*, Vol. 1, p. 293, (1946)]

reported that no product containing new carbon-carbon bonds were formed in the reaction of dihydromyrcene with sulfur. This latter fact is particularly significant since it indicates that all the crosslinks in rubber vulcanized with sulfur may be considered as containing the sulfur atom. If this is the case, the number of crosslinks is too great to permit the assumption of any crosslinkage other than the monosulfide. By assuming that monosulfides are the only crosslinks present in this new vulcanizate, it is possible to distribute the sulfur that has reacted as crosslinked sulfur (S_{cr}), chain sulfur (S_{ch}) and zinc sulfide ($S^{=}$). The implications of this division of the types of sulfur will be considered in detail.

The results of this investigation will be interpreted in terms of a simplified mechanism involving an unstable rubber-sulfur intermediate. Further reaction of this intermediate takes place through two simultaneous reactions; one leading to intermolecular monosulfides, the other to intramolecular sulfur derivatives. The intermolecular monosulfide reaction involves soluble zinc compounds and its relative proportion increases with increasing soluble zinc compound concentration.

The Rate Of Exchange Of Cellulose With D_2O. *V. J. Frilette and H. Mark (Institute of Polymer Research, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.).*

If dry cellulose is placed in heavy water, it is found that its hydroxyl groups exchange hydrogen for deuterium. A study was made of the rate of this exchange for various cellulose samples. In all cases essentially the same exchange curve was obtained; a fast reaction takes place first, which is essentially completed in less than one hour. It is followed by a much slower process which continues for days. For the samples studied, the fast exchange corresponded to the reaction of 40 to 75% of the hydroxyl groups present in the material. The subsequent slow reaction in about one week exchanged only a small additional percentage of hydroxyl groups. Complete reaction of all the hydroxyls was never obtained with any of the samples under the conditions of the experiments.

The results seem to indicate that the hydroxyl groups in a cellulose fiber may be divided essentially into those which are readily exchanged and those which are essentially not exchanged at all. The former are apparently very easily accessible; their existence has been already indicated by other experimental methods. Adopting the idea of the existence of highly ordered (crystalline) and essentially disordered (amorphous) domains in cellulose, it seems conceivable that the OH- groups, which exchange rapidly are located at the surface of the crystalline areas and throughout the amorphous portions. These two contributions amount to 40 to 75% of all hydroxyl groups, depending upon the sample under consideration. The residual OH- groups are apparently located inside of the crystalline domains and so strongly interlocked with each other by hydrogen bonds that they exchange H for D only very slowly.

Statex K—A New Furnace Carbon of Channel Black Quality

(Continued from Page 67)

minable. The furnace products are finally cooled to about 450° F. and passed through a Cottrel precipitator where the finely divided carbon particles are agglomerated through the action of a high voltage field. The resulting clusters of particles are then separated from the gases by centrifugal force in "cyclone" collectors.

A single Statex K furnace, occupying 400 sq. ft., produces as much carbon black as 35 of the old "channel houses" spread over 42,000 sq. ft. Its single "inferno" of hot gases is the equivalent of 46,000 luminous flames. Less than half as much steel and also less than half as much natural gas and yet better performance in the finished tires! Carload shipments began in 1946 and over a million pounds of Statex K have been marketed to the rubber industry at a premium price over that of channel black.

Characteristics and Properties

Statex K closely approaches channel black in fineness of sub-division. Instead of being acidic in nature, it is mildly alkaline due to its purity of surface (high pH). It is moderate in development of reticulate chain structure thus being suitable for both natural and synthetic rubber compounding. Because of its surface characteristics, it is superior to channel black in resistance to heat, to aging and to flex cracking. In road wear, results reported from half a dozen different tire companies indicate that whether in natural or synthetic rubber, the road wear performance is actually improved. Also it is found to process more economically and smoothly than channel black, thus facilitating manufacturing operations in the rubber plants. Due to its high pH, economies in the use of rubber accelerators are possible.

Outlook for the Future

The Statex K process represents a drastic change from the widely dispersed burning houses of the established channel industry. Modern engineering methods applied to large concentrated furnace units involve extensive and expensive instrumentation and controls together with a specialized technical, engineering, and operating staff.

At the present time, despite the improved economies in natural gas consumption, the manufacturing cost of Statex K is not lower but actually somewhat higher than that of existing channel black operations. However, with the progressively increasing demand for natural gas and its concomitant upward price trend, this situation is bound to change, and it appears inevitable that the introduction of Statex K now marks an historic turning point in the 75 year old carbon black industry.

LITERATURE REFERENCES

(1) *Ind. Eng. Chem.*, Vol. 29, p. 953 (1937).
(2) "Columbian Colloidal Carbons," Vol. II (1940), issued by Columbian Carbon Research Laboratories, New York.
(3) *Can. Chem. Proc. Ind.*, Vol. 25, p. 579 (1941).

Editorials . . . . . .

Free Trading

THE uncertainties afflicting the over-all rubber industry for the last few months are now of the past — quickly settled by a stroke of the pen on the part of President Truman. When the President affixed his signature to Public Law 24, 80th Congress, on March 29th, it solved two questions long troubling the industry: (1) It extended government control over the allocation and use of rubber for another year, until March 31, 1948; and (2) It removed the purchasing monopoly over natural rubber from the government and restored free trading, the latter effective April 1st.

The two actions, both covered in Public Law 24, were not unexpected. It was evident from the public hearings held by subcommittees of both the House and the Senate that the entire rubber manufacturing industry was strongly in favor of continued government control over allocation and use of rubber as a protective measure for the war-born synthetic industry. Therefore, continuation of government controls as covered in Rubber Order R-1 was a foregone conclusion. It was also evident that despite tremendous pressure brought by most of the large rubber manufacturers to continue monopoly on purchasing, Congressional sentiment favored immediate restoration of free trade. This is in keeping with the tempo of the present Congress.

Heading the list of reasons why the majority of rubber manufacturers preferred continued government purchasing was the present supply-and-demand situation. Proponents of this course of action insisted that no matter what action was taken, increased quantities of natural rubber could not be secured this year. They argued that restoration of free trade in view of this situation would do aught but increase the cost of natural rubber. They further argued that the British and Dutch governments had surrounded Far Eastern planters with so many regulations and restrictions that the term "free trade" did not actually apply in their territories, and therefore it was best to continue purchasing efforts at government levels.

It is still too early to predict the price trend in the next few months. In the interim, the trade is moving cautiously. Large rubber manufacturers are sitting back and have indicated they will not be importing in great volume for several months. The Commodity Exchange does not start functioning in futures until next month, with September listed as the first delivery date. The Reconstruction Finance Corporation has some 155,000 tons of natural rubber to sell, which represents a buffer stock against any sudden price increase.

What it all adds up to is this: The supply-and-demand factor is still the controlling element. The price of natural rubber within the next few months will be dependent on the quantities of such rubber available in the Far East. If the current rate of production in the Far East continues for the next few months, the price of rubber will probably be under the current price.

Tire Fabrics

STATISTICS can tell an interesting story, and those recently released on 1946 production of tire fabric and cord indicate the growing preference for rayon materials. According to the *Rayon Organon*, tire fabric and cord output in 1946 amounted to 522,000,000 pounds, a record high, of which 236,000,000 pounds was cotton tire fabric, 74,000,000 pounds was cotton tire cord, and 212,000,000 pounds was rayon and nylon tire fabric and cord. Of the latter amount the fiber used was predominantly rayon, since nylon was only in nominal use. Percentagewise, the 1946 production was 59% cotton and 41% rayon. The story told by the statistics can better be realized in the fact that the amount of rayon and nylon tire fabric and cord produced was approximately 24 times the amount of such fabric and cord produced in 1939.

CURRENT NEWS OF THE MONTH

RUBBER CONTROLS ARE EXTENDED AS FREE TRADING IS RESTORED

Legislation extending Government controls over the use and production of rubber until March 31, 1948, was signed by President Truman on March 29, two days before the initial authorization of such controls, contained in the Second War Powers Act, expired. The measure also ended Government purchasing of natural rubber as of March 31, 1947.

Provision was made in the new law, initially sponsored by Representative Crawford (Rep., Michigan) in the House of Representatives and officially known as Public Law 24, 80th Congress, for the extension of Government authority in the manufacture and sale of synthetic rubber, and in continuing research in synthetic rubber until such time as legislation is enacted to establish a permanent national defense rubber policy.

As a result of amendments added by the Senate and subsequently approved in the House, the law provides that the Government shall not declare as surplus and that the War Assets Administration shall not dispose of any synthetic rubber plant and/or facilities which cost the Government more than $5,000,000, until the effective date of permanent legislation on long-term rubber policy.

Certain "fringe" plants were, however, exempted from the limitations on plant disposal. Facilities so exempted included the neoprene plant, styrene plants, the petroleum-butadiene plant at Toledo, Ohio, two alcohol-butadiene plants, and butadiene-styrene copolymer plants to the extent that the aggregate actual capacity of such copolymer plants remaining in Government ownership shall not be less than 600,000 long tons per year.

CPA Issues Warning Note

Shortly after passing of the legislation, the Civilian Production Administration, now part of the Office of Temporary Controls, issued a statement emphasizing the fact that except for the ban on private importation of natural rubber and latex, present rubber controls will continue in force. Remaining controls provided by Rubber Order R-1 apply to allocation, consumption and inventories of rubber, specifications for rubber products, and to the importation of rubber products.

To conform to the new law which permits any person to import or accept delivery of rubber and latex, CPA on April 1 issued Direction 14 to the Rubber Order, cancelling provisions which previously restricted importation to the Reconstruction Finance Corp. Direction 14 provides that "any person accepting delivery of natural rubber and natural rubber latex for the purpose of consuming same" must comply with the Rubber Order.

Specifically, the legislation signed by President Truman is designed to keep the synthetic rubber industry going until Congress fixes a permanent rubber policy. Continued control over domestic allocation and use of natural rubber was retained in order to insure against individual companies acquiring and hoarding the still-scarce material to the detriment of other users.

Based on the restoration of free trade, and the expectancy of increased deliveries of natural rubber, it is believed that a revision of Rubber Order R-1 will shortly be issued. One of the revisions is expected to allow a larger inventory of natural rubber, now restricted to a 60-day supply.

Hotel Reservations

As previously announced, the Spring Meeting of the Rubber Division, A.C.S., will be held in Cleveland, Ohio, on May 26, 27 and 28. Headquarters for the meeting will be at the Hotel Cleveland. Some members planning to attend the meeting may be expecting to get a postcard on which they can make hotel reservations. No such postcards are being sent. As indicated in the official announcement of the meeting, all reservations should be addressed direct to the Hotel Cleveland and if any other hotel is desired that hotel should be specified in the letter. The reservations, however, should be addressed to the Hotel Cleveland.

White Sidewalls Permissible

Restrictions pertaining to the manufacture of white sidewall passenger car tires, in effect since Pearl Harbor, were eliminated by the Civilian Production Administration on April 14 with the issuance of Amendment 2 to Appendix II of Rubber Order R-1. The ban was lifted, according to CPA officials, because tire production has reached such heights that the control is no longer necessary. For the past few months some white sidewall production had been permitted on a limited basis. Shortages of raw materials, however, will delay quantity production of the white sidewall tires.

COMMODITY EXCHANGE RESUMING TRADING IN RUBBER FUTURES

Based on the legislation approved on March 29 by President Truman removing the Reconstruction Finance Corporation from the exclusive purchase of natural rubber, the Board of Governors of the Commodity Exchange, Inc., announced on April 1 that crude rubber futures trading, in suspension since February 6, 1942, will be resumed on the Exchange on Thursday, May 1.

The trading unit, it was announced, will be 10 long tons, as it was before the war, with delivery at New York City of four tenderable grades, of which No. 1 ribbed smoked sheets will be basic, No. 1X at 5 points premium, No. 2 at 50 points discount, and No. 3 at 100 points discount. First delivery month at the re-opening will be September, 1947, followed by each succeeding month up to and including July, 1948.

Although officially rubber futures trading was suspended February 6, 1942, free trading on the Exchange actually ceased on August 13, 1941. Trading was resumed on September 15, 1941, subject to a maximum fixed price of 22½c per pound. Liquidation of open interest proceeded until complete suspension finally went into effect.

RFC Announces Sales Plan

As of March 31, 1947, RFC had on hand, afloat or awaiting shipment a total of approximately 315,000 long tons of natural rubber, of which 160,000 tons is considered a strategic stockpile for national defense. RFC has announced that the balance of 155,000 tons will continue to be sold to domestic consumers through the Office of Rubber Reserve, in accordance with allocations made by the Civilian Production Administration.

During 1946 RFC purchased from Far Eastern sources some 150,000 tons of natural rubber at a price which made it necessary to sell such rubber at the basic price of 25¾c per pound in order to avoid loss. As of March 31, RFC had disposed of this rubber with the exception of 45,000 tons. As soon as these 45,000 tons are sold, RFC has stated, the basic price thereafter for the remaining 110,000 tons will be 23c per pound, ex dock or ex warehouse, plus the customary freight charge, except as regards certain grades of special crepes and latex for which prices will be announced later.

The sale of the 155,000 tons by RFC is expected to permit the orderly transition of the industry from government to private procurement.

DINSMORE HIGHLIGHTS DANGERS TO SYNTHETIC RUBBER INDUSTRY

At a Regional Meeting of the American Chemical Society, held on March 14 in Toledo, Ohio, Dr. R. P. Dinsmore, vice-president of the Goodyear Tire & Rubber Co., warned that the synthetic rubber problem will require careful study and consideration to crystallize American thinking in time to prevent the synthetic industry's collapse. He outlined tentative starting points for the formulation of a permanent program intended to preserve the country's interests.

With so many factors remaining uncertain, no single program has been suggested, the Goodyear executive said. It is possible that a final program must necessarily await the clarification of some of the factors, as for example, the character of the temporary legislation which soon should be passed. In order to establish a national rubber program, the following factors must be fixed: (1) The amount of synthetic rubber to be produced in peacetime; (2) The method of assuring production; and (3) The method of assuring consumption.

Rubber is a vital material to our country in war as well as in peace, Dr. Dinsmore stated, and we need recognition of the fact that its supply can be left neither to the mercy of our enemies nor to the commercial whims of our friends. It must be used continuously, and constantly improved in time of peace.

Commenting upon the factors that must be determined to reach accord on an established rubber program, the speaker offered the following points for consideration:

First, he felt that the majority of technical men in the industry are in favor of producing about 20% of our total rubber needs as American-made rubber. This is open to debate, but the amount should not be so small as to become a nuisance material instead of encouraging a progressive development program, nor too large as to constitute a burden to the production of quality products.

Secondly, twenty per cent of our present rubber requirements is about 200,000 long tons annually. Only about one-half of our present modern copolymer units conveniently situated to petroleum-butadiene sources could be operated with reasonable efficiency for this tonnage. The other half should be maintained in standby condition and not sold. This would permit ready expansion of 780,000 long tons. A decision must be made as to whether the plants should be government-operated or leased to private companies.

Thirdly, among the most feasible methods of assuring consumption of GR-S are continued specification of a minimum of GR-S according to product; issuing of a certificate with each purchase of GR-S which would permit the import of a fixed ratio of natural rubber; statutory provision that the industry must use a certain percentage of GR-S (allocated differently to the various major divisions of the industry), turning the industry over to private hands and relying upon competition to keep it alive.

Dr. Dinsmore admitted that present GR-S general purpose rubber has serious drawbacks, especially in high percentage use in heavy-duty tires for military vehicles and mechanized equipment. Therefore, until we can produce a rubber which overcomes this handicap one of our essential defense measures is to carry a stockpile of natural rubber adequate for heavy-duty tires both of the military and civilian types.

Only by continuing a live synthetic industry can we hope to improve present rubber and ultimately develop new and more satisfactory ones, the speaker declared. Fortunately, GR-S can probably take care of 80% of our requirements in case of war.

Coming Events

Apr. 22. Buffalo Rubber Group. Joint Meeting with Ontario Rubber Group. Hotel Brock, Niagara Falls, Ont.

May 9. Akron Rubber Group, Hotel Mayflower, Akron, Ohio.

May 9. Chicago Rubber Group, Hotel Morrison, Chicago, Ill.

May 9. Connecticut Rubber Group, Auditorium, United Illuminating Co., New Haven, Conn.

May 16. Detroit Rubber & Plactics Group, Detroit-Leland Hotel, Detroit, Mich.

May 16. Philadelphia Rubber Group, Kugler's Restaurant, Philadelphia.

May 24. Southern Ohio Rubber Group, Outing (Site to be Selected).

May 26-28. Rubber Division, A.C.S., Spring Meeting, Hotel Cleveland, Cleveland, Ohio.

June 16-19. A.S.M.E. Semi-Annual Meeting, Stevens Hotel, Chicago, Ill.

June 16-20. A.S.T.M., Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

June 27. New York Rubber Group, Annual Outing Blasberg's Grove, Hawthorne, N. J.

June 27. Boston Rubber Group, Annual Outing, Woodland Golf Club, Newton, Mass.

Sept. 15-19. A.C.S., 112th Meeting, New York City.

Movie on Materials Handling

The Automatic Transportation Co., 149 West 87th St., Chicago 20, Ill., recently completed a new 25-minute sound motion picture entitled "Pay Loads Pay Off." The film represents a study of the modern science of materials handling to reduce unit costs and help keep prices down. A preview of the film was held at the Commodore Hotel in New York City on March 12.

BIG FOUR AND RUBBER UNION AGREE ON HOURLY WAGE RISE

A nationwide strike was averted by a few hours when the country's four principal rubber manufacturers and the United Rubber, Cork, Linoleum & Plastic Workers of America (CIO) agreed on a wage increase of eleven and a half cents on hour in Cleveland, Ohio, on March 22. The agreement ended a six-day deadlock during which the companies held to a 10-cent an hour wage increase offer retroactive to March 2. The union had scaled down its original demand of 26 cents an hour to 16 cents with the increase to be retroactive to January 1. The 11½-cent rise is retroactive to February 2.

Covering about 110,000 workers, the new agreement will bring the average pay to rubber workers to approximately $1.45 an hour. Adoption of the 11½-cent an hour increase by the small tire and rubber companies would benefit about 100,000 additional rubber workers.

The agreement may point to an end of Big Four bargaining. While it makes possible a reopening of the wage issue on a Big Four basis in 120 days, the agreement states that its wage provision shall be incorporated in company-wide or local contracts negotiated in 1947 between the union and any of the Big Four.

L. M. Buckingham, counsel for the Big Four, which consists of the U. S. Rubber, Goodyear Tire & Rubber, B. F. Goodrich, and Firestone Tire & Rubber companies, praised the manner in which a crippling walkout was averted. He said that the rubber industry will not boost its price and, as a result of this reasonable settlement, it is altogether probable that the price of rubber products will be reduced because of increased production. Approximately 100,000 non-union office and salaried employees of the Big Four also will receive 11½-cent hourly pay increases, he indicated, estimating that the increases would cost the companies from $45,000,000 to $50,000,000 a year.

Raises will not be paid out of the inflated sales dollar, but out of a continued high volume of sales, the management official declared. He predicted that the industry's all-time production record of about 85,000,000 tires in 1946 will be maintained, and may even be expanded, in 1947.

The new agreement is the second to be reached through collective bargaining between the union and the Big Four. The first was concluded on March 2, 1946, granting workers an 18½-cent an hour increase.

While there may be some variations from local to local, it is expected that the new agreement will serve as a model for the smaller rubber companies. Settlements have already been reached between the union and the General Tire & Rubber, Pharis Tire & Rubber, Seiberling Rubber, and Mohawk Rubber companies, based on the 11½-cent an hour wage increase.

COMMITTEE D-11 ON RUBBER MAKES NEW RECOMMENDATIONS

A number of new tentative specifications and test methods were reported, several revisions in existing standards were discussed, and much activity in research in materials was covered at the meeting of A.S.T.M. Committee D-11 on Rubber and Rubber-Like Materials held in Philadelphia, Penna., the week of February 24 in conjunction with the Spring Meeting of the parent Society. The divisional meeting consisted of meetings and reports of the various subcommittees.

The Headquarters Building of the Society, located on Philadelphia's Parkway at Logan Square, was formally dedicated at exercises held on February 26. Dr. G. H. Clamer, senior living past president, presented the building on behalf of the membership to A.S.T.M. President Arthur W. Carpenter. The purchase and enlargement of the building was made possible through gifts from members totaling approximately $160,000. It is a four-story structure.

To Sponsor Rubber Symposium

During the meeting of Committee D-11 it was announced that the Committee plans to sponsor a Symposium on Rubber at the annual meeting of the Society in June, which will be held in Atlantic City. Plans for the symposium were discussed. Activities of the various subcommittees of Committee D-11 follow:

The Subcommittee on Protection of Persons from Electric Shock has been reorganized and its personnel enlarged. This committee will undertake a number of projects formerly carried on under ASA War Committee J-6 on Lineman's Rubber Protective Equipment and will function as a sectional committee under American Standards Association procedure. It was reported that the specifications for rubber gloves (D-120) will be revised and that consideration is being given to an ozone resistance test for this type of rubber insulation.

The Subcommittee on Insulated Wire and Cable discussed at its meeting specifications for thermoplastic jackets; also requirements for insulated conductors of small diameters and requirements for moisture-resistant insulating compound. These matters will receive further study.

The Subcommittee on Abrasion Tests for Rubber Products recommended a revision in the Standard Methods of Test for Abrasion Resistance of Rubber Compounds (D-394-46) providing for the elimination of Method C which covers the United States Rubber Co. Abrader.

The Subcommittee on Life Tests for Rubber Products is giving consideration to methods for the aging of vinyl chloride and a long-time cooperative investigation of air oven test methods for synthetic rubbers. This would include a shelf aging test for periods of six months, 1, 2, 3 and 4 years, and arrangements have been made for sufficient samples for two additional longer time periods after the 4-year period has been reached. Work is under way in some seven cooperating laboratories. Other matters under consideration include a study of GR-S aging data and the effect of miscellaneous properties (temperature and light and atmosphere and contact with the material) on the life of rubber and rubber-like materials.

The Subcommittee on Adhesion Tests presented an extensive revision of the Standard Method of Test for Adhesion of Vulcanized Rubber to Metal (D-429-39) comprising changes in the present procedure to be designated Method A and adding a new Method B. The new Method B covers the procedure for testing the strength of adhesion of rubber to metals in articles where the parts consist of metal and rubber, but having the metal plate on one side of the rubber strip only. The method is designed primarily to apply to specimens prepared in a laboratory under standardized conditions such as may be used to provide data for development and control of rubber compounds and methods of manufacture. The revised methods also provide a standard adhesion terminology for reporting the results of the test.

The Subcommittee on Tests for Coated Fabrics discussed at length cooperative studies to be undertaken on abrasion tests. Consideration will be given to the Tabor Abrader, the American Seeding Co. Abrasion Machine, and the Wyzenbeeck Machine. The Committee has also been interested in scrubbing tests for coated fabrics and at the meeting there was exhibited the scrubbing test apparatus developed by the Ordnance Department.

The Subcommittee on Plasticity Tests reported preparation of methods covering tests for processability which will include the Mooney viscometer and others. It is planned to present these proposed methods for publication as information only.

The Subcommittee on Tests of Resilience has prepared definitions and explanations of the following terms as a basis for its activities: resilience, hysteresis, dynamic modulus, and damping.

Simon Collier, of the Johns-Manville Corp., New York, is chairman of Committee D-11. Arthur W. Carpenter, who is president of the Society, also functions as secretary of the committee.

Phillips Develops New Rubber

Development of an improved butadiene-styrene synthetic rubber which appears to be the equivalent of natural rubber in many important properties has been announced by the Phillips Petroleum Co., Bartlesville, Oklahoma. The announcement was made by K. S. Adams, president. According to G. G. Oberfell, vice-president in charge of research, the present GR-S plants could be adapted for the manufacture of the new rubber with some additions and modifications. Preliminary estimates indicate that it could be produced at a cost comparable with that of GR-S. The only clue furnished with regard to the new synthetic was the statement accompanying the announcement that the development of improved processes for the manufacture of synthetic rubber has come only recently with the development of rapid emulsion polymerization recipes which permit low temperature operation.

Tire Production in January

Tire manufacturers continued their record breaking rate of production during January, according to the Rubber Manufacturers Association. A new high in monthly production of passenger car casings was established when the industry produced 6,888,566 units, an increase of 12.9% over the previous month. A total of 1,619,377 truck and bus casings was produced, 14.3% over December, 1946, as well as 8,719,463 passenger, truck and bus tubes, an increase of 15.5%.

GOODRICH TUSCALOOSA PLANT NEARING CAPACITY PRODUCTION

View of the new $11,000,000 Tuscaloosa, Alabama, plant of the B. F. Goodrich Co., which is reported approaching its capacity production of 6,000 tires and tubes daily. Said to be the most modern in the industry, the Tuscaloosa plant was completed late in 1946.

SOME INTERESTING PATENTS AVAILABLE FOR LICENSING OR SALE

During the past year the United States Patent Office of the Department of Commerce, Washington, D. C., has been issuing a "Register of Patents" on a regular basis. The patents listed in the "Register," taken from the Official Patent Gazette, are offered by the patentees or assignees for license or sale. Descriptions of a number of such patents, which should prove of interest to rubber manufacturers and others in the rubber field, taken from recent issues of the "Register," follow herewith:

Massage Applicator. (Pat. No. 2,048,713, July 28, 1936.) Applicator is a circular comb-like part which fits over body of electric vibrator. The slidable stem and springed body cushion the oscillation and allow a means to regulate pressure. When applied to the scalp, teeth of comb loosen foreign matter and promote circulation. May also be employed on body or used manually, if preferred, without electric vibrator.—Owner: Adolf P. C. Schramm, 212 E. 48th St., New York 17, N. Y.

Towel or Cloth Holder. (Pat. No. 2,339,187, January 11, 1944). Towel or dish cloth is firmly held by pushing corner through a slit of a soft rubber member which comprises the face of cylindrical holder. The device may be secured to a wall at any suitable location. Towel is removed by simply pulling from holder. - Owner: Herbert Pain, c/o Eric Pick, Room 700, 330 West 42nd St., New York 18, N. Y.

Preparation of Chlorinated Rubber Compositions. (Pat. No. 2,382,529, August 14, 1945). The process relates to the treatment of low cost fatty oils (corn, castor, cottonseed) which are not usually employed in the compounding of chlorinated rubber compositions. The oil is first treated with a salt capable of promoting heat-bodying and heated at temperatures ranging between 100° C. and 300° C. While at a high temperature, a dissolution promoting agent is sometimes added to render certain oils soluble in the solvent with which the chlorinated rubber is later blended. The addition of the oils provides protective or decorative coatings of easy brushing or spraying consistency. - Owner: Laszlo Auer, P. O. Box 184, 88 Harding Drive, South Orange, N. J.

Crutch Tip. (Pat. No. 2,403,632, July 9, 1946). A resilient tip or pad is held by a cup-shaped washer and attached to the crutch leg by a screw. The screw holds a coil spring so that it is interposed between the screw head and the pad. The tip structure thus simulates universal-joint action without requiring the cumbersome joints usually required for this purpose. The tip is guarded so that string, weeds, etc., cannot work themselves into the joint. - Owner: Lee L. Brown, Port Isable, Texas.

Tire Shield. (Pat. No. 2,397,741, April 2, 1946). A protector plate to prevent injury to walls of tires mounted on dual wheels. Made of a rigid durable material of the contour of a tire and placed over inside wall of each tire, the shield is provided with openings for circulation of air to prevent overheating of brakes. It assumes load of wheels when tires are flat and prevents tires being run on when deflated. Easily applied and removed.-Owner: Joseph A. Jordan, Jr., McGuire General Hospital, Ward 23, East Richmond 19, Va.

Tire Valve. (Pat. No. 2,378,384, June 19, 1945). *Combination Valve and Water Adapter for Tire Tubes.* (Pat. No. 2,400,969, May 28, 1946). These two patents cover valves for facilitating the filling or inflating of inner tubes with either air or water and the recovery of the fluid if desired. In Patent 2, 378,384, the valve has an outer end, with usual valve guts and seat, which may be removed and replaced by an adapter to which a hose may be connected. As the adapter is screwed on the valve, the end of a slidable, tubular core projects inside the inner tube. The end of a vent tube carried by the adapter is simultaneously forced inside the inner tube. This vent may also function for introduction of air to force liquid from tube. Patent 2,400,969 has a valve with a lateral extension. The outer end of the extension, with valve guts and seat, may be removed and replaced by an adapter which comprises only a threaded sleeve and hose connection. A vent tube is inserted through the valve so that its end projects inside the inner tube, but this tube does not pass through the extension. - Owner: Karl V. Baker, Malaga, Ohio.

Windshield Shield. (Pat. No. 2,331,600 October 12, 1943). A detachable, formfitting cover for a windshield to prevent the accumulation of snow or sleet thereon. A cord extends through hem around article and tensioning means on lower corners are attached to door hinges. Attaching pins run through eyelets in top edge and fasten to vehicle body. Two light springs connect cord sections and securely hold cover to vehicle. Inexpensive to manufacture and easily and quickly attached or removed. - Owner: Arthur P. Dillow, 835 Herndon Court, Baltimore 25, Md.

Hand Sanding and Rubbing Block. (Pat. No. 2,256,098, Sept. 16, 1941.) Because of its flexibility, block may be used on curved and flat surfaces alike. Block has pocket and depression to fit hand. A strap serves as securing means. Abrasive or polishing material is held by clamps. May be molded of rubber or like material.—Owner: Dodd Mauldin, 7775½ Hollywood Blvd., Los Angeles 46, Calif.

Adhesive Tape. (Pat. No. 2,399,545, April 30, 1946). In this patent, the conventional adhesive tape (usually sold in rolls or sheets) is made handier to use. The usual strip is perforated and provided with spaced nicks or cuts along each edge, and the adhesive backing (instead of being spread solidly) is applied in spaced rows, resulting in a considerable saving. These features are said to offer the following advantages: the nicks along the edges enable the user to tear the tape to a more exact length without the use of shears; the perforations not only allow the circulation of air but permit use of solutions in the treatment of sprains and swellings without removing the dressing; and the spaced rows make strappings less painful to remove. - Owner: Bernard E. Davis, 239 Prospect Pl., Brooklyn 17, N. Y.

Weather Strip. (Pat. No. 2,260,649, Oct. 28, 1941.) Adjustable spring-urged weather-stripping for casement windows. —co-owner: Howard H. Turner, c/o C. G. Stratton, 433 South Spring St., Los Angeles 13, Calif.

USSR Opens Guayule Factory

According to reports in the Soviet press, a new processing factory for guayule has been opened in Azerbaidzhan, U. S. S. R. Built in the center of the guayule growing district, the factory produced the first few experimental tons of rubber in October, 1946. Cultivation of guayule was begun in Azerbaidzhan before the war, but at that time the crops had to be sent to other Soviet republics for processing. Total area under guayule cultivation was about 1,000 hectares (approximately 2,500 acres) in 1946, but is expected to increase by 2,000 hectares in 1947.

Ball-Band Liqua-Tex Footwear

A new type of waterproof footwear has been introduced by the Mishawaka Rubber & Woolen Manufacturing Co., Mishawaka, Ind., for industrial use as well as for dress and sports wear. Made by a new process which was started by the company before the war, the footwear, known as Ball-Band Liqua-Tex, is literally sealed in latex before it is heat cured. This process makes possible the manufacture of footwear without seams, which are reported lighter and more flexible than footwear produced by conventional methods.

West Co. Moves to New Plant

West Co., Inc., has moved from Philadelphia, Penna., to its new plant and office building at Phoenixville, Penna. The company, however, will continue to operate its Philadelphia plant for an indefinite period of time. The new telephone number is Phoenixville 719. H. O. West is president of the company.

Standard and Special Purpose GR-S Polymers[1]

(As Compiled by the Office of Rubber Reserve, Reconstruction Finance Corporation, as of February 1, 1947)

GR-S Type	*Derivation*	*Polymer Mooney ML-4-212° F.*	*Soap Emulsifier*	*Stabilizer*	*Coagulation or Solids Content*	*Approximate Monomer Charge Ratio*	*Remarks*
GR-S Standard	Original Type	45-55	Fatty Acid	PBNA or BLE	Salt Acid	71/29 B/S	General purpose.
GR-S-AC	Original Type	45-55	Fatty Acid	PBNA or BLE	Alum	71/29 B/S	General purpose, low water absorption, increased viscosity stability.
GR-S-10	X-244	50-60	Rosin Acid	PBNA or BLE	Salt Acid	71/29 B/S	General improvement in physical properties and tack for tires, soles and heels, conveyor belting, hoses, coated fabrics, etc.
GR-S-10-AC	X-222	55-65	Rosin Acid	PBNA or BLE	Alum	71/29 B/S	GR-S-10 with lower water absorption and increased viscosity stability.
GR-S-12-AC	X-12	65-75	Fatty Acid	PBNA or BLE	Alum	71/29 B/S	Similar to GR-S-AC, more body from higher Mooney, production dormant.
GR-S-16	X-272	95-105	Rosin Acid	Stalite[2]	Glue-Acid	71/29 B/S	High Mooney low water absorption GR-S-10. Increased body in uncured stocks, higher tensile with mineral pigments, higher cured hardness, relatively non-staining, adhesives, spreading doughs, packings, hard rubber.
GR-S-17	X-273	50-60	Rosin Acid	EFED[3]	Salt Acid	71/29 B/S	Non-staining and non-discoloring GR-S-10 with similar properties otherwise. Uses similar to GR-S-25 where additional tack is required.
GR-S-20-AC	X-13	40-50	Fatty Acid	PBNA or BLE	Alum	71/29 B/S	GR-S-AC at lower Mooney requires less breakdown, used in sponge, hard rubber, inner tubes, and mechanicals.
GR-S-25	X-178	45-55	Fatty Acid	EFED[3]	Salt Acid	71/29 B/S	Properties similar to GR-S except non-staining and non-discoloring. Pale in color, for white and light-colored products, upholstery tubing, door gaskets, electric cable and plugs, soles and heels, etc.
GR-S-38	X-95, X-138	45-55	Fatty Acid	PBNA or BLE	Salt Acid	71/29 B/S	Procurable only as standard GR-S, made by continuous polymerization.
GR-S-40-AC	X-245	40-50	Fatty Acid	EFED[3]	Alum	50/50 B/S	Improved thermoplasticity and flow characteristics, low water absorption with higher tensile, modulus and hardness and increased stiffness in uncured compounds and easier breakdown.
GR-S-50	GR-S-ST[4]	45-55	Fatty Acid	Stalite[2]	Salt Acid	71/29 B/S	Properties similar to GR-S except staining and discoloring properties intermediate between GR-S and GR-S-25. Molded products, garden hose sponge, drug sundries, hospital sheeting, coated and combined fabrics, etc.
GR-S-60	X-285	50-65	Fatty Acid	BLE or PBNA	Salt Acid	71/28.5/0.5 B/S/D	Superior processing, higher gel and better heat resistance generally used in blends for calendered, extruded or molded products, hard rubber, footwear, insulation, coated and combined fabrics.
GR-S-65	X-165, X-165A	45-55	Fatty Acid	BLE or PBNA	Glue-Acid	71/29 B/S	Very low water absorption—wire insulation, heels and soles, hard rubber, hoses, etc.
GR-S-85	X-26, X-27	90-110	Fatty Acid	BLE or PBNA	Salt Acid	71/29 B/S	Increased body in uncured stocks, higher tensiles with mineral pigments, higher cure hardness. Adhesives, spreading doughs, etc.
GR-S-Black-1	X-140, X-228	35-45	Fatty Acid	PBNA or BLE	Salt Acid	71/29 B/S	Latex masterbatch containing 50 parts EPC black per 100 parts polymer.
GR-S-Black-2	X-348	35-45	Fatty Acid	PBNA or BLE	Salt Acid	71/29 B/S	Latex masterbatch containing 46 parts EPC black per 100 parts polymer.
GR-S Latex I	Original Type	.....	Fatty Acid	PBNA or BLE	26%-28%	71/29 B/S	General purpose—film discolors.
GR-S Latex II	Original Type	.....	Fatty Acid	None	26%-28%	71/29 B/S	General purpose—film discolors.
GR-S Latex III	Original Type	.....	Rosin Acid	None	37%-39%	50/50 B/S	General purpose—paper saturant, can sealing, etc.
GR-S Latex IV	X-230	.....	Rosin Acid	None	39%-45%	50/50 B/S	General purpose.
GR-S Latex V	X-276	65-95[5]	Mixed Fatty and Rosin Acid	None	58% (min.)	70/30 B/S	65-95 Mooney—foamed sponge.

(1) Reference should be made to GR-S number rather than X-number. (2) Relatively non-staining. (3) Non-staining. (4) Original type. (5) MS-1½-212° F. (Small Rotor).

Note: A complete list of all numbered and experimental copolymers may be obtained by writing to the Office of Rubber Reserve, Reconstruction Finance Corp., Washington 25, D. C.

DEVELOP NEW EQUIPMENT FOR HANDLING VOLATILE BUTADIENE GAS

New equipment designed for handling volatile butadiene gas used in the manufacture of synthetic rubber, and including the latest type of automatic fire protection devices, was recently installed at the government-owned plant operated by the Goodyear Tire & Rubber Co. in Akron. Said to be the only installation of its type in the world, this system cost approximately $500,000. Not only designed for immediate reaction against any threat or actual outbreak of fire, this equipment will also detect and give warning of escaping butadiene.

An important feature of this new system is that all butadiene used at the Akron plant is stored and circulated under water, thereby eliminating much of the fire hazard. Received at the plant in liquid form, the butadiene is circulated in pipe lines through a series of canals and large storage reservoirs extending over nearly three acres.

Another outstanding highlight is the fire equipment itself, which consists of a completely automatic waterfog system, highly sensitive to heat. Waterfog units comprise a multitude of special orifices extending throughout the entire area of butadiene processing, and these are particularly concentrated around each reservoir where the gas is stored.

These waterfog orifices extend through fifteen individual units, electrically synchronized so that they will operate either simultaneously, or in series. The units in turn are operated by centrally located valves which are automatic, and which can be manually controlled. These valves are dependent upon a connected air line with an air pressure maintained at one pound.

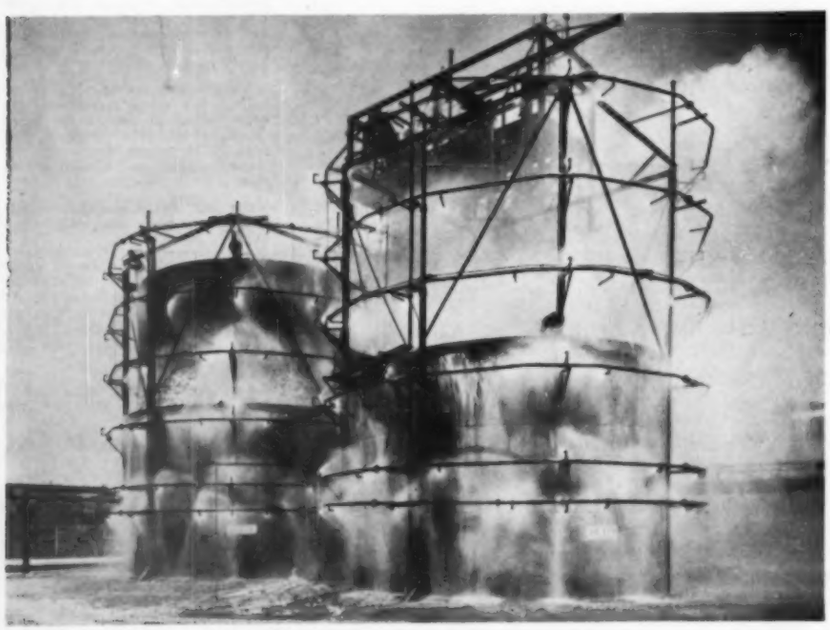
In conjunction with the air line, heat actuator devices are placed at frequent locations, with the actuators designed to react instantly to any increase in temperature. Presence of fire, therefore, would affect the heat actuators and raise the air pressure, resulting in the expansion of air in the line. This expansion reflects upon the control valve, so that the latter releases waterfog units surrounding the fire, and water comes on within one-half second of the time warning is given of increased heat. Rated capacity of water output of this system is 5000 gallons per minute.

Operating in connection with the waterfog units is a Mine Safety Combustible Gas Detecting Unit, also fully automatic. This appliance is designed to carry on a constant sampling of air, as it analyzes for concentrations of butadiene which might be present as a result of possible leaks in process lines.

Collaborating upon the Akron project were the Automatic Sprinkler Company of America (designers of the equipment), Goodyear technicians, the National Board of Fire Underwriters, and the Factory Insurance Association, with the entire program financed by Rubber Reserve.

Celebrates 60th Anniversary

Arthur D. Little, Inc., 30 Memorial Drive, Cambridge 42, Mass., consulting industrial research laboratory, recently celebrated its sixtieth anniversary. The organization was founded as the firm of Griffin and Little in a small office in Boston, Mass., in 1886. The present staff of 175 now occupies a group of buildings in Cambridge.



These storage tanks contain butadiene in gaseous form at Goodyear-operated Rubber Reserve plant in Akron. Gas in tanks is controlled by water above gas level with weight-operated gas holder forming pressure against the butadiene. Added safety measure is installation of numerous waterfog heads shown blanketing the tanks.

Goodrich Koroseal Cordage

Koroseal cordage, made with nineteen strands of rayon cord and jacketed with a coating of white Koroseal, has been developed by the B. F. Goodrich Co. The company claims that the product has all the good characteristics of the best quality cotton cordage of .150-inch diameter plus a number of added advantages. These the manufacturer gives as follows: tensile strength of 150 to 200 pounds, non-kinking and non-twisting, remarkable resistance to abrasion, no reduction in tensile after 200 hours water spray and weathering test at 125° F., no significant change in characteristics after oven test at 48° F. for 48 hours, and very little shrinkage in water boiling test of 24 hours. The product is merchandised in 50-foot hanks with twelve hanks to a box and twelve boxes to a shipping section.

North China Rubber Industry

Despite the shortage of natural rubber, all rubber manufacturing factories in North China are producing at full capacity, according to a letter recently received from the China Export & Import Co., 96 Seymour Road, Tientsin, China. The letter pointed out that before the Japanese surrender there were only twelve rubber factories in Tientsin, but today there are over seventy, many having been started by the former employees of the Japanese rubber factories. Incidentally, the China Import & Export Co. is interested in hearing from American manufacturers and suppliers of rubber chemicals who wish to establish a sales agency to supply this fast growing industry in China.

Chemical Research in India

India is planning to establish a national chemical laboratory upon a 430-acre tract of land at Poona at a cost of approximately $2,500,000, according to report. The main divisions projected are the following: Chemistry of High Polymers; Chemical Engineering; Inorganic Chemistry, including Analytical Chemistry; Physical Chemistry, including Electro-Chemistry; Survey and Intelligence; and Organic Chemistry. Among the immediate problems of national importance to be studied are surveys of raw materials and their industrial potentialities, utilization of by-products from existing industry, and the development of key industries.

A booklet describing its fiber bonding processes, containing illustrations of the newest models of machinery, verbatim copies of the patents, and the license agreement, has been made available by Dan River Mills, Inc., Danville, Va.

The R. R. Olin Laboratories, Akron 9, Ohio, one of the oldest consulting technologist organizations on rubber problems in the country, recently celebrated its twentieth anniversary.

DATA ON WIRE CORD TIRES IS SUPPLIED BY FIRESTONE

Some additional interesting information on the wire cord tire has been made available by the Firestone Tire & Rubber Co., Akron. Because of the greater strength of the wire cord, fewer plies are required in a tire than with cotton or rayon. The wire cord, which is composed of several strands of wire .0058-inch in diameter twisted together, is .036-inch in diameter. Each 9.00-20 four-ply tire produced by the company contains more than 55 miles of the hair-like strands, which weigh approximately 28 pounds.

The promising possibilities of the wire cord tire for off-the-highway service are said to be fundamentally due to three characteristics of the metallic cord: high sustained strength under high temperatures; negligible stretch under load; the ability, as the result of the greater conductivity of the wire construction, to dissipate heat away from the vulnerable points.

As with the conventional tire, the wire cord tire must be inspected regularly for cuts and snags and the necessary repairs made immediately. Overloading and the mismating of duals should be avoided if the maximum results are to be obtained. The company warns that above all, proper inflation must be maintained through regular and frequent checks. Best performance is obtained from wire cord tires when they are operated at pressures 30% higher than cotton or rayon cord tires. If a 9.00-20 rayon tire operates successfully at a cold inflation of 65 pounds, then the wire cord tire should be inflated to 85 pounds.

Best results are obtained in dual operations when the wire cord tires are installed as matched sets. The wire cord tire does not "grow" during service and, if mated with a conventional tire which does "grow," the load may not be properly shared during the life of the two tires.

Wire cord tires can be repaired by conventional tire repairing methods. Injuries have been repaired satisfactorily using standard patches and materials. In one case, a two-inch gash was purposely cut through the tread and body of a wire cord tire. The hole was repaired by merely filling with rubber and vulcanizing. This repair operated for several thousand miles with no enlargement of the opening, demonstrating the reserve strength of the wire construction. In another case, a tire was gashed with the tread and two outer plies being shaved off for about a foot, leaving but two plies. This tire was retreaded without reinforcing and ran an additional 21,000 miles.

Firestone has been intensively developing wire cord tires for the past several years. The tires have been found to give unusual service in tractor-trailer operations, giving as much as 103,000 miles on original treads and still running. In another instance, a wire cord tire with a retread has run 118,000 miles and is still in service.

Lake Baseball

The latest sport introduced to swimming enthusiasts is lake baseball. Introduced at Orlando, Florida, the game is played with a floating diamond, with swim fins instead of spikes for the feet and water wings for the catcher. The pitcher's box and home plate are two eight foot square wooden rafts, while bases and infield positions are rubber life rafts. Rubber swim fins in the Orlando experiment were furnished by the Sea-Net Manufacturing Co.

Multi-Weaving Process

Multi-Weaving is the name applied to a versatile new process developed by the General Electric Co. in which rubber, plastics, metals, and certain fabrics may be combined to produce a new kind of composite material in a great variety of designs and shapes. Products of multi-weaving may be composed of materials of the same base family group or composed of materials of different family groups or combinations thereof. The process is said to make possible literally hundreds of unique designs and styling combinations with varying characteristics. Further information on the multi-weaving process, still largely in the development stage, can be secured from the Electronic Department, General Electric Co., Thompson Road, Syracuse, N. Y.

Trade Mart Is Established

The International Trade Mart, a non-profit organization, has been established in New Orleans, Louisiana, as a modern display and trading center, offering space to foreign and domestic manufacturers to display and sell products of every variety. The mart will be housed in the remodeled Baldwin Building on the corner of Camp and Common Streets in New Orleans. This building will provide exhibit and sales space for approximately 200 American and foreign concerns, and feature a variety of products, including rubber, plastics, chemicals, industrial supplies, and machinery of all types.

Goodyear Water and Air Hose

Development of a new line of water and air hose, called the Black Wing Cord Line, which is said to feature a body structure based on a new manufacturing principle, has been announced by the Goodyear Tire & Rubber Co., Akron. Horizontally braided, an exclusive method of bonding cover, carcass, and tube together is said to give the new hose rope-like flexibility and yet to retain maximum ruggedness. The hose utilizes a cabled cotton body for greater carcass strength, and a seamless tube said to be unaffected by lubricants which often cause swelling and flaking.

TIRE PRODUCTION AND SHIPMENTS SET ALL-TIME RECORDS IN 1946

During 1946, the production of automotive pneumatic tires by American manufacturers amounted to 82,013,412 units, while shipments totaled 81,859,657 units, exceeding the previous all-time record year of 1928 when 77,943,814 tires were produced and 74,295,913 tires were shipped, according to the latest statistical report of the Rubber Manufacturers Association. In 1941, the last previous peacetime year, production was 61,540,196 units and 66,163,934 units were shipped. According to the report, this record was made possible by a more readily available supply of material and manpower, and the industry's efforts to supply the demand of American motorists for new tires which they were denied during the war period.

Passenger car tire production during 1946 amounted to 66,258,566 units, an increase of 135% over the 1945 total of 28,199,792 units. Truck and bus tire production in 1946 decreased slightly from the output of the previous year, dropping from 16,324,121 units to 15,754,846 units. Production of tubes in passenger car, truck and bus sizes registered an increase of 84.33%, climbing from 41,741,641 units to 76,940,546 units.

Shipments of passenger car tires in 1946 amounted to 66,084,135 units, an increase of 146% over the 26,799,975 units shipped during the previous year, while inventories at the end of 1946 amounted to 1,769,785 units, as compared with 2,214,517 units at the end of the previous year. Total 1946 shipments of truck and bus tires totaled 15,775,522 units, against 16,167,132 units shipped during 1945, while inventories at the end of 1946 amounted to 687,497 units as compared with 862,664 units at the end of 1945.

Shipments of passenger car, truck and bus tubes during the year increased 88.23%, climbing from 40,304,246 units to 75,865,823 units, while inventories at the end of 1946 amounted to 3,903,019 units, against 3,627,481 units at the end of the previous year.

The Association's report indicates that export markets received 1,515,941 automotive pneumatic tires during 1946, which is slightly less than 2% of the 81,859,657 units produced during the year. A total of 54,338,849 passenger car tires were shipped during the year as replacements, while the automobile industry received 11,081,684 units for original equipment.

Guayule Plant for Sale

The government-owned guayule processing plant at Bakersfield, Calif., has been offered for sale or lease by the War Assets Administration. Built at a cost of $350,000, the plant is one of the two owned by the government for extracting rubber from guayule. Experiments in guayule are still being conducted by the government on a small scale.

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Editorials . . . . . .

Free Trading

THE uncertainties afflicting the over-all rubber industry for the last few months are now of the past — quickly settled by a stroke of the pen on the part of President Truman. When the President affixed his signature to Public Law 24, 80th Congress, on March 29th, it solved two questions long troubling the industry: (1) It extended government control over the allocation and use of rubber for another year, until March 31, 1948; and (2) It removed the purchasing monopoly over natural rubber from the government and restored free trading, the latter effective April 1st.

The two actions, both covered in Public Law 24, were not unexpected. It was evident from the public hearings held by subcommittees of both the House and the Senate that the entire rubber manufacturing industry was strongly in favor of continued government control over allocation and use of rubber as a protective measure for the war-born synthetic industry. Therefore, continuation of government controls as covered in Rubber Order R-1 was a foregone conclusion. It was also evident that despite tremendous pressure brought by most of the large rubber manufacturers to continue monopoly on purchasing, Congressional sentiment favored immediate restoration of free trade. This is in keeping with the tempo of the present Congress.

Heading the list of reasons why the majority of rubber manufacturers preferred continued government purchasing was the present supply-and-demand situation. Proponents of this course of action insisted that no matter what action was taken, increased quantities of natural rubber could not be secured this year. They argued that restoration of free trade in view of this situation would do aught but increase the cost of natural rubber. They further argued that the British and Dutch governments had surrounded Far Eastern planters with so many regulations and restrictions that the term "free trade" did not actually apply in their territories, and therefore it was best to continue purchasing efforts at government levels.

It is still too early to predict the price trend in the next few months. In the interim, the trade is moving cautiously. Large rubber manufacturers are sitting back and have indicated they will not be importing in great volume for several months. The Commodity Exchange does not start functioning in futures until next month, with September listed as the first delivery date. The Reconstruction Finance Corporation has some 155,000 tons of natural rubber to sell, which represents a buffer stock against any sudden price increase.

What it all adds up to is this: The supply-and-demand factor is still the controlling element. The price of natural rubber within the next few months will be dependent on the quantities of such rubber available in the Far East. If the current rate of production in the Far East continues for the next few months, the price of rubber will probably be under the current price.

Tire Fabrics

STATISTICS can tell an interesting story, and those recently released on 1946 production of tire fabric and cord indicate the growing preference for rayon materials. According to the *Rayon Organon*, tire fabric and cord output in 1946 amounted to 522,000,000 pounds, a record high, of which 236,000,000 pounds was cotton tire fabric, 74,000,000 pounds was cotton tire cord, and 212,000,000 pounds was rayon and nylon tire fabric and cord. Of the latter amount the fiber used was predominantly rayon, since nylon was only in nominal use. Percentagewise, the 1946 production was 59% cotton and 41% rayon. The story told by the statistics can better be realized in the fact that the amount of rayon and nylon tire fabric and cord produced was approximately 24 times the amount of such fabric and cord produced in 1939.

COMMITTEE D-11 ON RUBBER MAKES NEW RECOMMENDATIONS

A number of new tentative specifications and test methods were reported, several revisions in existing standards were discussed, and much activity in research in materials was covered at the meeting of A.S.T.M. Committee D-11 on Rubber and Rubber-Like Materials held in Philadelphia, Penna., the week of February 24 in conjunction with the Spring Meeting of the parent Society. The divisional meeting consisted of meetings and reports of the various subcommittees.

The Headquarters Building of the Society, located on Philadelphia's Parkway at Logan Square, was formally dedicated at exercises held on February 26. Dr. G. H. Clamer, senior living past president, presented the building on behalf of the membership to A.S.T.M. President Arthur W. Carpenter. The purchase and enlargement of the building was made possible through gifts from members totaling approximately $160,000. It is a four-story structure.

To Sponsor Rubber Symposium

During the meeting of Committee D-11 it was announced that the Committee plans to sponsor a Symposium on Rubber at the annual meeting of the Society in June, which will be held in Atlantic City. Plans for the symposium were discussed. Activities of the various subcommittees of Committee D-11 follow:

The Subcommittee on Protection of Persons from Electric Shock has been reorganized and its personnel enlarged. This committee will undertake a number of projects formerly carried on under ASA War Committee J-6 on Lineman's Rubber Protective Equipment and will function as a sectional committee under American Standards Association procedure. It was reported that the specifications for rubber gloves (D-120) will be revised and that consideration is being given to an ozone resistance test for this type of rubber insulation.

The Subcommittee on Insulated Wire and Cable discussed at its meeting specifications for thermoplastic jackets; also requirements for insulated conductors of small diameters and requirements for moisture-resistant insulating compound. These matters will receive further study.

The Subcommittee on Abrasion Tests for Rubber Products recommended a revision in the Standard Methods of Test for Abrasion Resistance of Rubber Compounds (D-394-46) providing for the elimination of Method C which covers the United States Rubber Co. Abrader.

The Subcommittee on Life Tests for Rubber Products is giving consideration to methods for the aging of vinyl chloride and a long-time cooperative investigation of air oven test methods for synthetic rubbers. This would include a shelf aging test for periods of six months, 1, 2, 3 and 4 years, and arrangements have been made for sufficient samples for two additional longer time periods after the 4-year period has been reached. Work is under way in some seven cooperating laboratories. Other matters under consideration include a study of GR-S aging data and the effect of miscellaneous properties (temperature and light and atmosphere and contact with the material) on the life of rubber and rubber-like materials.

The Subcommittee on Adhesion Tests presented an extensive revision of the Standard Method of Test for Adhesion of Vulcanized Rubber to Metal (D-429-39) comprising changes in the present procedure to be designated Method A and adding a new Method B. The new Method B covers the procedure for testing the strength of adhesion of rubber to metals in articles where the parts consist of metal and rubber, but having the metal plate on one side of the rubber strip only. The method is designed primarily to apply to specimens prepared in a laboratory under standardized conditions such as may be used to provide data for development and control of rubber compounds and methods of manufacture. The revised methods also provide a standard adhesion terminology for reporting the results of the test.

The Subcommittee on Tests for Coated Fabrics discussed at length cooperative studies to be undertaken on abrasion tests. Consideration will be given to the Tabor Abrader, the American Seeding Co. Abrasion Machine, and the Wyzenbeeck Machine. The Committee has also been interested in scrubbing tests for coated fabrics and at the meeting there was exhibited the scrubbing test apparatus developed by the Ordnance Department.

The Subcommittee on Plasticity Tests reported preparation of methods covering tests for processability which will include the Mooney viscometer and others. It is planned to present these proposed methods for publication as information only.

The Subcommittee on Tests of Resilience has prepared definitions and explanations of the following terms as a basis for its activities: resilience, hysteresis, dynamic modulus, and damping.

Simon Collier, of the Johns-Manville Corp., New York, is chairman of Committee D-11. Arthur W. Carpenter, who is president of the Society, also functions as secretary of the committee.

Phillips Develops New Rubber

Development of an improved butadiene-styrene synthetic rubber which appears to be the equivalent of natural rubber in many important properties has been announced by the Phillips Petroleum Co., Bartlesville, Oklahoma. The announcement was made by K. S. Adams, president. According to G. G. Oberfell, vice-president in charge of research, the present GR-S plants could be adapted for the manufacture of the new rubber with some additions and modifications. Preliminary estimates indicate that it could be produced at a cost comparable with that of GR-S. The only clue furnished with regard to the new synthetic was the statement accompanying the announcement that the development of improved processes for the manufacture of synthetic rubber has come only recently with the development of rapid emulsion polymerization recipes which permit low temperature operation.

Tire Production in January

Tire manufacturers continued their record breaking rate of production during January, according to the Rubber Manufacturers Association. A new high in monthly production of passenger car casings was established when the industry produced 6,888,566 units, an increase of 12.9% over the previous month. A total of 1,619,377 truck and bus casings was produced, 14.3% over December, 1946, as well as 8,719,463 passenger, truck and bus tubes, an increase of 15.5%.

GOODRICH TUSCALOOSA PLANT NEARING CAPACITY PRODUCTION

View of the new $11,000,000 Tuscaloosa, Alabama, plant of the B. F. Goodrich Co., which is reported approaching its capacity production of 6,000 tires and tubes daily. Said to be the most modern in the industry, the Tuscaloosa plant was completed late in 1946.

SOME INTERESTING PATENTS AVAILABLE FOR LICENSING OR SALE

During the past year the United States Patent Office of the Department of Commerce, Washington, D. C., has been issuing a "Register of Patents" on a regular basis. The patents listed in the "Register," taken from the Official Patent Gazette, are offered by the patentees or assignees for license or sale. Descriptions of a number of such patents, which should prove of interest to rubber manufacturers and others in the rubber field, taken from recent issues of the "Register," follow herewith:

Massage Applicator. (Pat. No. 2,048,713, July 28, 1936.) Applicator is a circular comb-like part which fits over body of electric vibrator. The slidable stem and springed body cushion the oscillation and allow a means to regulate pressure. When applied to the scalp, teeth of comb loosen foreign matter and promote circulation. May also be employed on body or used manually, if preferred, without electric vibrator.—Owner: Adolf P. C. Schramm, 212 E. 48th St., New York 17, N. Y.

Towel or Cloth Holder. (Pat. No. 2,339,187, January 11, 1944). Towel or dish cloth is firmly held by pushing corner through a slit of a soft rubber member which comprises the face of cylindrical holder. The device may be secured to a wall at any suitable location. Towel is removed by simply pulling from holder. - Owner: Herbert Pain, c/o Eric Pick, Room 700, 330 West 42nd St., New York 18, N. Y.

Preparation of Chlorinated Rubber Compositions. (Pat. No. 2,382,529, August 14, 1945). The process relates to the treatment of low cost fatty oils (corn, castor, cottonseed) which are not usually employed in the compounding of chlorinated rubber compositions. The oil is first treated with a salt capable of promoting heat-bodying and heated at temperatures ranging between 100° C. and 300° C. While at a high temperature, a dissolution promoting agent is sometimes added to render certain oils soluble in the solvent with which the chlorinated rubber is later blended. The addition of the oils provides protective or decorative coatings of easy brushing or spraying consistency. - Owner: Laszlo Auer, P. O. Box 184, 88 Harding Drive, South Orange, N. J.

Crutch Tip. (Pat. No. 2,403,632, July 9, 1946). A resilient tip or pad is held by a cup-shaped washer and attached to the crutch leg by a screw. The screw holds a coil spring so that it is interposed between the screw head and the pad. The tip structure thus simulates universal-joint action without requiring the cumbersome joints usually required for this purpose. The tip is guarded so that string, weeds, etc., cannot work themselves into the joint. - Owner: Lee L. Brown, Port Isable, Texas.

Tire Shield. (Pat. No. 2,397,741, April 2, 1946). A protector plate to prevent injury to walls of tires mounted on dual wheels. Made of a rigid durable material of the contour of a tire and placed over inside wall of each tire, the shield is provided with openings for circulation of air to prevent overheating of brakes. It assumes load of wheels when tires are flat and prevents tires being run on when deflated. Easily applied and removed.-Owner: Joseph A. Jordan, Jr., McGuire General Hospital, Ward 23, East Richmond 19, Va.

Tire Valve. (Pat. No. 2,378,384, June 19, 1945). *Combination Valve and Water Adapter for Tire Tubes.* (Pat. No. 2,400,969, May 28, 1946). These two patents cover valves for facilitating the filling or inflating of inner tubes with either air or water and the recovery of the fluid if desired. In Patent 2, 378,384, the valve has an outer end, with usual valve guts and seat, which may be removed and replaced by an adapter to which a hose may be connected. As the adapter is screwed on the valve, the end of a slidable, tubular core projects inside the inner tube. The end of a vent tube carried by the adapter is simultaneously forced inside the inner tube. This vent may also function for introduction of air to force liquid from tube. Patent 2,400,969 has a valve with a lateral extension. The outer end of the extension, with valve guts and seat, may be removed and replaced by an adapter which comprises only a threaded sleeve and hose connection. A vent tube is inserted through the valve so that its end projects inside the inner tube, but this tube does not pass through the extension. - Owner: Karl V. Baker, Malaga, Ohio.

Windshield Shield. (Pat. No. 2,331,600 October 12, 1943). A detachable, formfitting cover for a windshield to prevent the accumulation of snow or sleet thereon. A cord extends through hem around article and tensioning means on lower corners are attached to door hinges. Attaching pins run through eyelets in top edge and fasten to vehicle body. Two light springs connect cord sections and securely hold cover to vehicle. Inexpensive to manufacture and easily and quickly attached or removed. - Owner: Arthur P. Dillow. 835 Herndon Court, Baltimore 25, Md.

Hand Sanding and Rubbing Block. (Pat. No. 2,256,098, Sept. 16, 1941.) Because of its flexibility, block may be used on curved and flat surfaces alike. Block has pocket and depression to fit hand. A strap serves as securing means. Abrasive or polishing material is held by clamps. May be molded of rubber or like material.—Owner: Dodd Mauldin, 7775½ Hollywood Blvd., Los Angeles 46, Calif.

Adhesive Tape. (Pat. No. 2,399,545, April 30, 1946). In this patent, the conventional adhesive tape (usually sold in rolls or sheets) is made handier to use. The usual strip is perforated and provided with spaced nicks or cuts along each edge, and the adhesive backing (instead of being spread solidly) is applied in spaced rows, resulting in a considerable saving. These features are said to offer the following advantages: the nicks along the edges enable the user to tear the tape to a more exact length without the use of shears; the perforations not only allow the circulation of air but permit use of solutions in the treatment of sprains and swellings without removing the dressing; and the spaced rows make strappings less painful to remove. - Owner: Bernard E. Davis, 239 Prospect Pl., Brooklyn 17, N. Y.

Weather Strip. (Pat. No. 2,260,649, Oct. 28, 1941.) Adjustable spring-urged weather-stripping for casement windows. —co-owner: Howard H. Turner, c/o C. G. Stratton, 433 South Spring St., Los Angeles 13, Calif.

USSR Opens Guayule Factory

According to reports in the Soviet press, a new processing factory for guayule has been opened in Azerbaidzhan, U. S. S. R. Built in the center of the guayule growing district, the factory produced the first few experimental tons of rubber in October, 1946. Cultivation of guayule was begun in Azerbaidzhan before the war, but at that time the crops had to be sent to other Soviet republics for processing. Total area under guayule cultivation was about 1,000 hectares (approximately 2,500 acres) in 1946, but is expected to increase by 2,000 hectares in 1947.

Ball-Band Liqua-Tex Footwear

A new type of waterproof footwear has been introduced by the Mishawaka Rubber & Woolen Manufacturing Co., Mishawaka, Ind., for industrial use as well as for dress and sports wear. Made by a new process which was started by the company before the war, the footwear, known as Ball-Band Liqua-Tex, is literally sealed in latex before it is heat cured. This process makes possible the manufacture of footwear without seams, which are reported lighter and more flexible than footwear produced by conventional methods.

West Co. Moves to New Plant

West Co., Inc., has moved from Philadelphia, Penna., to its new plant and office building at Phoenixville, Penna. The company, however, will continue to operate its Philadelphia plant for an indefinite period of time. The new telephone number is Phoenixville 719. H. O. West is president of the company.

Announcing STATEX-K

We take pleasure in announcing that Columbian Carbon Company has reached the successful culmination of a long-range research program costing millions of dollars. This program was directed to the replacement of the 75 year old channel process by a modern, more efficient furnace process without loss in quality of the product.

This goal was reached in 1946 and over a million pounds of the new product have been sold to the rubber industry at a premium price over channel black. The ultimate saving in natural gas resulting from this improved manufacturing process would be about 200 billions of cubic feet annually—a major contribution to the national economy.

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The name of the new product is

STATEX-K

COLUMBIAN CARBON CO.
MANUFACTURER

BINNEY & SMITH CO.
DISTRIBUTOR

MICRONEX

▪

STATEX-K

▪

STATEX-B

▪

STATEX-93

▪

FURNEX

▪

COLUMBIAN CARBON CO.
MANUFACTURER

BINNEY & SMITH CO.
DISTRIBUTOR

Standard and Special Purpose GR-S Polymers[1]

(As Compiled by the Office of Rubber Reserve, Reconstruction Finance Corporation, as of February 1, 1947)

GR-S Type	*Derivation*	*Polymer Mooney ML-4-212° F.*	*Soap Emulsifier*	*Stabilizer*	*Coagulation or Solids Content*	*Approximate Monomer Charge Ratio*	*Remarks*
GR-S Standard	Original Type	45-55	Fatty Acid	PBNA or BLE	Salt Acid	71/29 B/S	General purpose.
GR-S-AC	Original Type	45-55	Fatty Acid	PBNA or BLE	Alum	71/29 B/S	General purpose, low water absorption, increased viscosity stability.
GR-S-10	X-244	50-60	Rosin Acid	PBNA or BLE	Salt Acid	71/29 B/S	General improvement in physical properties and tack for tires, soles and heels, conveyor belting, hoses, coated fabrics, etc.
GR-S-10-AC	X-222	55-65	Rosin Acid	PBNA or BLE	Alum	71/29 B/S	GR-S-10 with lower water absorption and increased viscosity stability.
GR-S-12-AC	X-12	65-75	Fatty Acid	PBNA or BLE	Alum	71/29 B/S	Similar to GR-S-AC, more body from higher Mooney, production dormant.
GR-S-16	X-272	95-105	Rosin Acid	Stalite[2]	Glue-Acid	71/29 B/S	High Mooney low water absorption GR-S-10. Increased body in uncured stocks, higher tensile with mineral pigments, higher cured hardness, relatively non-staining, adhesives, spreading doughs, packings, hard rubber.
GR-S-17	X-273	50-60	Rosin Acid	EFED[3]	Salt Acid	71/29 B/S	Non-staining and non-discoloring GR-S-10 with similar properties otherwise. Uses similar to GR-S-25 where additional tack is required.
GR-S-20-AC	X-13	40-50	Fatty Acid	PBNA or BLE	Alum	71/29 B/S	GR-S-AC at lower Mooney requires less breakdown, used in sponge, hard rubber, inner tubes, and mechanicals.
GR-S-25	X-178	45-55	Fatty Acid	EFED[3]	Salt Acid	71/29 B/S	Properties similar to GR-S except non-staining and non-discoloring. Pale in color, for white and light-colored products, upholstery tubing, door gaskets, electric cable and plugs, soles and heels, etc.
GR-S-38	X-95, X-138	45-55	Fatty Acid	PBNA or BLE	Salt Acid	71/29 B/S	Procurable only as standard GR-S, made by continuous polymerization.
GR-S-40-AC	X-245	40-50	Fatty Acid	EFED[3]	Alum	50/50 B/S	Improved thermoplasticity and flow characteristics, low water absorption with higher tensile, modulus and hardness and increased stiffness in uncured compounds and easier breakdown.
GR-S-50	GR-S-ST[4]	45-55	Fatty Acid	Stalite[2]	Salt Acid	71/29 B/S	Properties similar to GR-S except staining and discoloring properties intermediate between GR-S and GR-S-25. Molded products, garden hose sponge, drug sundries, hospital sheeting, coated and combined fabrics, etc.
GR-S-60	X-285	50-65	Fatty Acid	BLE or PBNA	Salt Acid	71/28.5/0.5 B/S/D	Superior processing, higher gel and better heat resistance generally used in blends for calendered, extruded or molded products, hard rubber, footwear, insulation, coated and combined fabrics.
GR-S-65	X-165, X-165A	45-55	Fatty Acid	BLE or PBNA	Glue-Acid	71/29 B/S	Very low water absorption—wire insulation, heels and soles, hard rubber, hoses, etc.
GR-S-85	X-26, X-27	90-110	Fatty Acid	BLE or PBNA	Salt Acid	71/29 B/S	Increased body in uncured stocks, higher tensiles with mineral pigments, higher cure hardness. Adhesives, spreading doughs, etc.
GR-S-Black-1	X-140, X-228	35-45	Fatty Acid	PBNA or BLE	Salt Acid	71/29 B/S	Latex masterbatch containing 50 parts EPC black per 100 parts polymer.
GR-S-Black-2	X-348	35-45	Fatty Acid	PBNA or BLE	Salt Acid	71/29 B/S	Latex masterbatch containing 46 parts EPC black per 100 parts polymer.
GR-S Latex I	Original Type	.....	Fatty Acid	PBNA or BLE	26%-28%	71/29 B/S	General purpose—film discolors.
GR-S Latex II	Original Type	.....	Fatty Acid	None	26%-28%	71/29 B/S	General purpose—film discolors.
GR-S Latex III	Original Type	.....	Rosin Acid	None	37%-39%	50/50 B/S	General purpose—paper saturant, can sealing, etc.
GR-S Latex IV	X-230	.....	Rosin Acid	None	39%-45%	50/50 B/S	General purpose.
GR-S Latex V	X-276	65-95[5]	Mixed Fatty and Rosin Acid	None	58% (min.)	70/30 B/S	65-95 Mooney—foamed sponge.

(1) Reference should be made to GR-S number rather than X-number. (2) Relatively non-staining. (3) Non-staining. (4) Original type. (5) MS-1½-212° F. (Small Rotor).

Note: A complete list of all numbered and experimental copolymers may be obtained by writing to the Office of Rubber Reserve, Reconstruction Finance Corp., Washington 25, D. C.

DEVELOP NEW EQUIPMENT FOR HANDLING VOLATILE BUTADIENE GAS

New equipment designed for handling volatile butadiene gas used in the manufacture of synthetic rubber, and including the latest type of automatic fire protection devices, was recently installed at the government-owned plant operated by the Goodyear Tire & Rubber Co. in Akron. Said to be the only installation of its type in the world, this system cost approximately $500,000. Not only designed for immediate reaction against any threat or actual outbreak of fire, this equipment will also detect and give warning of escaping butadiene.

An important feature of this new system is that all butadiene used at the Akron plant is stored and circulated under water, thereby eliminating much of the fire hazard. Received at the plant in liquid form, the butadiene is circulated in pipe lines through a series of canals and large storage reservoirs extending over nearly three acres.

Another outstanding highlight is the fire equipment itself, which consists of a completely automatic waterfog system, highly sensitive to heat. Waterfog units comprise a multitude of special orifices extending throughout the entire area of butadiene processing, and these are particularly concentrated around each reservoir where the gas is stored.

These waterfog orifices extend through fifteen individual units, electrically synchronized so that they will operate either simultaneously, or in series. The units in turn are operated by centrally located valves which are automatic, and which can be manually controlled. These valves are dependent upon a connected air line with an air pressure maintained at one pound.

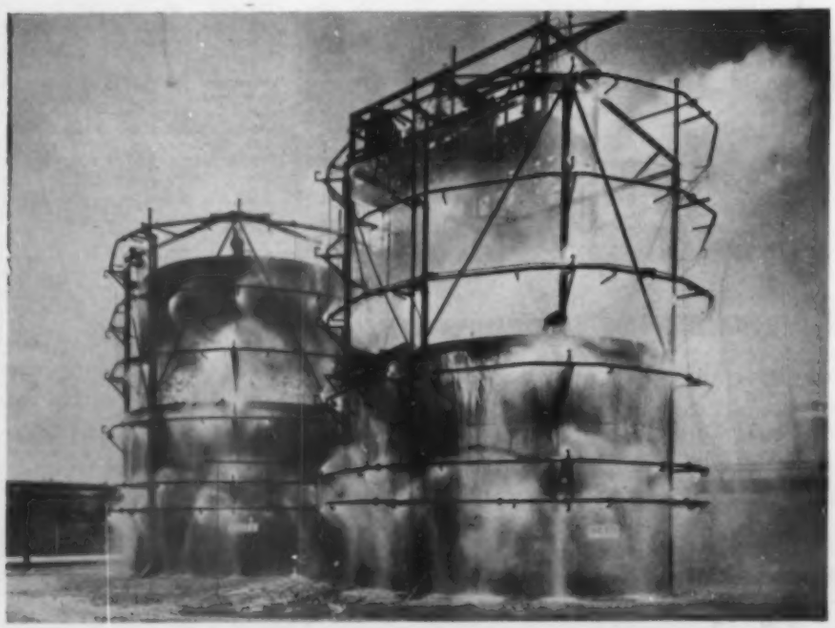
In conjunction with the air line, heat actuator devices are placed at frequent locations, with the actuators designed to react instantly to any increase in temperature. Presence of fire, therefore, would affect the heat actuators and raise the air pressure, resulting in the expansion of air in the line. This expansion reflects upon the control valve, so that the latter releases waterfog units surrounding the fire, and water comes on within one-half second of the time warning is given of increased heat. Rated capacity of water output of this system is 5000 gallons per minute.

Operating in connection with the waterfog units is a Mine Safety Combustible Gas Detecting Unit, also fully automatic. This appliance is designed to carry on a constant sampling of air, as it analyzes for concentrations of butadiene which might be present as a result of possible leaks in process lines.

Collaborating upon the Akron project were the Automatic Sprinkler Company of America (designers of the equipment), Goodyear technicians, the National Board of Fire Underwriters, and the Factory Insurance Association, with the entire program financed by Rubber Reserve.

Celebrates 60th Anniversary

Arthur D. Little, Inc., 30 Memorial Drive, Cambridge 42, Mass., consulting industrial research laboratory, recently celebrated its sixtieth anniversary. The organization was founded as the firm of Griffin and Little in a small office in Boston, Mass., in 1886. The present staff of 175 now occupies a group of buildings in Cambridge.



These storage tanks contain butadiene in gaseous form at Goodyear-operated Rubber Reserve plant in Akron. Gas in tanks is controlled by water above gas level with weight-operated gas holder forming pressure against the butadiene. Added safety measure is installation of numerous waterfog heads shown blanketing the tanks.

Goodrich Koroseal Cordage

Koroseal cordage, made with nineteen strands of rayon cord and jacketed with a coating of white Koroseal, has been developed by the B. F. Goodrich Co. The company claims that the product has all the good characteristics of the best quality cotton cordage of .150-inch diameter plus a number of added advantages. These the manufacturer gives as follows: tensile strength of 150 to 200 pounds, non-kinking and non-twisting, remarkable resistance to abrasion, no reduction in tensile after 200 hours water spray and weathering test at 125° F., no significant change in characteristics after oven test at 48° F. for 48 hours, and very little shrinkage in water boiling test of 24 hours. The product is merchandised in 50-foot hanks with twelve hanks to a box and twelve boxes to a shipping section.

North China Rubber Industry

Despite the shortage of natural rubber, all rubber manufacturing factories in North China are producing at full capacity, according to a letter recently received from the China Export & Import Co., 96 Seymour Road, Tientsin, China. The letter pointed out that before the Japanese surrender there were only twelve rubber factories in Tientsin, but today there are over seventy, many having been started by the former employees of the Japanese rubber factories. Incidentally, the China Import & Export Co. is interested in hearing from American manufacturers and suppliers of rubber chemicals who wish to establish a sales agency to supply this fast growing industry in China.

Chemical Research in India

India is planning to establish a national chemical laboratory upon a 430-acre tract of land at Poona at a cost of approximately $2,500,000, according to report. The main divisions projected are the following: Chemistry of High Polymers; Chemical Engineering; Inorganic Chemistry, including Analytical Chemistry; Physical Chemistry, including Electro-Chemistry; Survey and Intelligence; and Organic Chemistry. Among the immediate problems of national importance to be studied are surveys of raw materials and their industrial potentialities, utilization of by-products from existing industry, and the development of key industries.

A booklet describing its fiber bonding processes, containing illustrations of the newest models of machinery, verbatim copies of the patents, and the license agreement, has been made available by Dan River Mills, Inc., Danville, Va.

The R. R. Olin Laboratories, Akron 9, Ohio, one of the oldest consulting technologist organizations on rubber problems in the country, recently celebrated its twentieth anniversary.

DATA ON WIRE CORD TIRES IS SUPPLIED BY FIRESTONE

Some additional interesting information on the wire cord tire has been made available by the Firestone Tire & Rubber Co., Akron. Because of the greater strength of the wire cord, fewer plies are required in a tire than with cotton or rayon. The wire cord, which is composed of several strands of wire .0058-inch in diameter twisted together, is .036-inch in diameter. Each 9.00-20 four-ply tire produced by the company contains more than 55 miles of the hair-like strands, which weigh approximately 28 pounds.

The promising possibilities of the wire cord tire for off-the-highway service are said to be fundamentally due to three characteristics of the metallic cord: high sustained strength under high temperatures; negligible stretch under load; the ability, as the result of the greater conductivity of the wire construction, to dissipate heat away from the vulnerable points.

As with the conventional tire, the wire cord tire must be inspected regularly for cuts and snags and the necessary repairs made immediately. Overloading and the mismating of duals should be avoided if the maximum results are to be obtained. The company warns that above all, proper inflation must be maintained through regular and frequent checks. Best performance is obtained from wire cord tires when they are operated at pressures 30% higher than cotton or rayon cord tires. If a 9.00-20 rayon tire operates successfully at a cold inflation of 65 pounds, then the wire cord tire should be inflated to 85 pounds.

Best results are obtained in dual operations when the wire cord tires are installed as matched sets. The wire cord tire does not "grow" during service and, if mated with a conventional tire which does "grow," the load may not be properly shared during the life of the two tires.

Wire cord tires can be repaired by conventional tire repairing methods. Injuries have been repaired satisfactorily using standard patches and materials. In one case, a two-inch gash was purposely cut through the tread and body of a wire cord tire. The hole was repaired by merely filling with rubber and vulcanizing. This repair operated for several thousand miles with no enlargement of the opening, demonstrating the reserve strength of the wire construction. In another case, a tire was gashed with the tread and two outer plies being shaved off for about a foot, leaving but two plies. This tire was retreaded without reinforcing and ran an additional 21,000 miles.

Firestone has been intensively developing wire cord tires for the past several years. The tires have been found to give unusual service in tractor-trailer operations, giving as much as 103,000 miles on original treads and still running. In another instance, a wire cord tire with a retread has run 118,000 miles and is still in service.

Lake Baseball

The latest sport introduced to swimming enthusiasts is lake baseball. Introduced at Orlando, Florida, the game is played with a floating diamond, with swim fins instead of spikes for the feet and water wings for the catcher. The pitcher's box and home plate are two eight foot square wooden rafts, while bases and infield positions are rubber life rafts. Rubber swim fins in the Orlando experiment were furnished by the Sea-Net Manufacturing Co.

Multi-Weaving Process

Multi-Weaving is the name applied to a versatile new process developed by the General Electric Co. in which rubber, plastics, metals, and certain fabrics may be combined to produce a new kind of composite material in a great variety of designs and shapes. Products of multi-weaving may be composed of materials of the same base family group or composed of materials of different family groups or combinations thereof. The process is said to make possible literally hundreds of unique designs and styling combinations with varying characteristics. Further information on the multi-weaving process, still largely in the development stage, can be secured from the Electronic Department, General Electric Co., Thompson Road, Syracuse, N. Y.

Trade Mart Is Established

The International Trade Mart, a non-profit organization, has been established in New Orleans, Louisiana, as a modern display and trading center, offering space to foreign and domestic manufacturers to display and sell products of every variety. The mart will be housed in the remodeled Baldwin Building on the corner of Camp and Common Streets in New Orleans. This building will provide exhibit and sales space for approximately 200 American and foreign concerns, and feature a variety of products, including rubber, plastics, chemicals, industrial supplies, and machinery of all types.

Goodyear Water and Air Hose

Development of a new line of water and air hose, called the Black Wing Cord Line, which is said to feature a body structure based on a new manufacturing principle, has been announced by the Goodyear Tire & Rubber Co., Akron. Horizontally braided, an exclusive method of bonding cover, carcass, and tube together is said to give the new hose rope-like flexibility and yet to retain maximum ruggedness. The hose utilizes a cabled cotton body for greater carcass strength, and a seamless tube said to be unaffected by lubricants which often cause swelling and flaking.

TIRE PRODUCTION AND SHIPMENTS SET ALL-TIME RECORDS IN 1946

During 1946, the production of automotive pneumatic tires by American manufacturers amounted to 82,013,412 units, while shipments totaled 81,859,657 units, exceeding the previous all-time record year of 1928 when 77,943,814 tires were produced and 74,295,913 tires were shipped, according to the latest statistical report of the Rubber Manufacturers Association. In 1941, the last previous peacetime year, production was 61,540,196 units and 66,163,934 units were shipped. According to the report, this record was made possible by a more readily available supply of material and manpower, and the industry's efforts to supply the demand of American motorists for new tires which they were denied during the war period.

Passenger car tire production during 1946 amounted to 66,258,566 units, an increase of 135% over the 1945 total of 28,199,792 units. Truck and bus tire production in 1946 decreased slightly from the output of the previous year, dropping from 16,324,121 units to 15,754,846 units. Production of tubes in passenger car, truck and bus sizes registered an increase of 84.33%, climbing from 41,741,641 units to 76,940,546 units.

Shipments of passenger car tires in 1946 amounted to 66,084,135 units, an increase of 146% over the 26,799,975 units shipped during the previous year, while inventories at the end of 1946 amounted to 1,769,785 units, as compared with 2,214,517 units at the end of the previous year. Total 1946 shipments of truck and bus tires totaled 15,775,522 units, against 16,167,132 units shipped during 1945, while inventories at the end of 1946 amounted to 687,497 units as compared with 862,664 units at the end of 1945.

Shipments of passenger car, truck and bus tubes during the year increased 88.23%, climbing from 40,304,246 units to 75,865,823 units, while inventories at the end of 1946 amounted to 3,903,019 units, against 3,627,481 units at the end of the previous year.

The Association's report indicates that export markets received 1,515,941 automotive pneumatic tires during 1946, which is slightly less than 2% of the 81,859,657 units produced during the year. A total of 54,338,849 passenger car tires were shipped during the year as replacements, while the automobile industry received 11,081,684 units for original equipment.

Guayule Plant for Sale

The government-owned guayule processing plant at Bakersfield, Calif., has been offered for sale or lease by the War Assets Administration. Built at a cost of $350,000, the plant is one of the two owned by the government for extracting rubber from guayule. Experiments in guayule are still being conducted by the government on a small scale.

TALK BY GULLEKSON ON BUTYL HEARD BY CALIFORNIA GROUP

The March meeting of the Northern California Rubber Group, which featured a talk by E. E. Gullekson, of the California Research Corp., on "Butyl Rubber," was held at Angelo's Restaurant in Emeryville, Calif., on March 20. J. W. Crosby, president of the Thiokol Corp., and Ross E. Morris, senior rubber technologist at the rubber laboratory of the U. S. Naval Shipyard at Mare Island, Calif., also spoke at the meeting.

In his talk, Mr. Gullekson discussed the various steps that led to the development of butyl as we know it today. He noted that the Standard Oil Co. developed Vistanex, a material which had wide use in the coating field but which could not be vulcanized, by basing its research on work which had been performed in Germany on an elastomer called Oppenol. Additional research by the company led to the development of a material that could be vulcanized and this became known as butyl.

Prior to the entry of the United States into the war, Standard Oil had under construction a plant for the commercial production of butyl, the speaker stated. This plant, the capacity of which was doubled during the construction period, was taken over by the government after Pearl Harbor. A plant of like capacity was constructed in Texas and a smaller one in Canada. The total production capacity of all the plants amounted to 77,000 tons of butyl annually.

Mr. Gullekson indicated that butyl is in widespread use at present for the manufacture of passenger car tubes because of its exceptional air retention qualities. Butyl polymers are made by low temperature catalytic copolymerization of isobutylene with a small percentage of isoprene. The polymer possesses a low degree of chemical unsaturation and is resistant to oxidation and chemical attack. Its physical properties result from the chain like configuration of the polymer molecules, together with its chemical nature which governs its response to vulcanization and the addition of fillers and chemical modifiers.

Mr. Morris presented additional information on the applications and compounding of butyl in an impromptu discussion at the conclusion of Mr. Gullekson's talk. He declared that in butyl there is seemingly a double bond where the isoprene joins the polymer. Since these double bonds are not too prevalent because of the small percentage of isoprene in the copolymer, butyl has a low degree of chemical unsaturation and consequently vulcanizes slower than natural rubber. This vulcanization is stopped by unsaturated oils or other polymers.

Certain physical properties of butyl can be traced to its chemical composition, Mr. Morris said. It is extremely high in extensibility because of the infrequent double bonds; has a tendency to depolymerize during the sulfur cure; has a high resistance to chemicals; and is much less permeable to air than other elastomers. Like neoprene, butyl is strong in the pure gum state, although in this state it can not be processed. By the use of proper tie-gums, it can be bonded to metal.

In his talk, Mr. Crosby described the characteristics and advantages of Thiokol, showing how the product has been improved during the past few years. He also touched on the aims of his company for future research and expansion.

Average Weekly Income

The average weekly income of workers in the rubber manufacturing industry available for spending in terms of 1939 dollars amounted to $27.60 in 1939, $37.30 in mid-1945, and $32.30 in the autumn of 1946, according to an estimate recently made by *Business Week* based on information published by the Department of Labor and the Department of Commerce. Percentagewise, the figures show an increase of 35% from 1939 to mid-1945, a drop of 14% from mid-1945 to the autumn of 1946, and a gain of 17% from 1939 to the autumn of 1946. Workers in the printing and publishing field and in the transportation equipment field received the highest average weekly income ($33.90) in the autumn of 1946.

Quebec Group Hears Kemp

Approximately 125 members and guests attended the March Meeting of the Quebec Rubber and Plastics Group, held at the Ritz Carlton Hotel in Montreal, Quebec, on March 7. Dr. A. R. Kemp, who is in charge of all research and development work at the Bell Telephone Laboratories, Murray Hill, N. J., was the principal speaker of the evening. A film dealing with the Fastax high speed motion picture camera was also shown. In his talk on "Modern Trends in Rubber and Plastics," Dr. Kemp discussed volume production, price levels, and future trends of various types of synthetic and natural rubber and plastics.

Connecticut to Meet May 9

The Spring Meeting of the Connecticut Rubber Group will be held on Friday evening, May 9, at the auditorium of the United Illuminating Co., in New Haven, Conn. The technical subject for the meeting will be "Plastics and the Rubber Industry." H. F. Wakefield, development engineer of the thermosetting division of the Bakelite Corp. will discuss phenolic plastics in the rubber industry, while J. K. Honish, development engineer of the thermoplastics division of the same company will talk on extrusion and molding of elastomeric and rubber-like plastics.

ROWZEE IS FEATURED SPEAKER AT MEETING OF ONTARIO GROUP

The March Meeting of the Ontario Rubber Section of the Chemical Institute of Canada was held at the Diana Sweets Restaurant in Toronto, Ontario, on March 7, with E. R. Rowzee, director of research of the Polymer Corp., Sarnia, Ontario, as the principal speaker.

In his talk on "Synthetic Rubber in Canada and Abroad," Mr. Rowzee presented a resume of conditions in several European countries which he visited during his recent trip abroad. Unless there is a wide margin in price between natural rubber and GR-S, he said, England, Norway, and Sweden will use nearly all natural rubber because of the scarcity of dollar exchange. Other countries expect to use 25% to 35% synthetic rubber in the manufacture of mechanical goods and passenger car tires and tubes.

Referring to Germany, the speaker stated that there are three GR-S producing units in that country with a production of 5,000 tons a month, or half of pre-war production. Buna S-3 was said to have superior physical properties to standard Buna S but rather poor processing characteristics. Radox polymerization appears interesting in that it uses an oxidizing and reducing catalyst which at 32° F. gives a complete reaction in one hour, he pointed out. The adoption of this system in American plants would enable us to have a true continuous process in the manufacture of GR-S in contrast to the batch process being used at present.

Turning to the rubber situation in Canada, Mr. Rowzee declared that Polymer Corp. will be producing high solids GR-S latex by the middle of the year. The government-owned corporation's pilot plant produces up to one ton of GR-S and there is a new Butyl pilot plant under construction. Predicting a reduction in the price of GR-S in a few months, he said that GR-S may be sold for as low as 15c a pound.

Buffalo to Hear McWilliams

Robert McWilliams, of the General Motors Research Laboratory, will be the principal speaker at the next meeting of the Buffalo Rubber Group, to be held jointly with the Ontario Rubber Group. The meeting will be held on Tuesday, April 22, at the General Brock Hotel in Niagara Falls, Ontario. Mr. McWilliams will speak on the use of rubber in the automotive industry.

Akron Group to Meet May 9

Frank H. Carman, general manager of the Plastic Materials Manufacturers Association, will be the principal speaker at the Spring Meeting of the Akron Rubber Group, scheduled to be held at the Mayflower Hotel in Akron on May 9. Announcement will be made at the meeting of results of the election of officers for the coming year.

BOSTON RUBBER GROUP HEARS PAPERS BY WALSH AND THIES

Approximately 400 members and guests at the Spring Meeting of the Boston Rubber Group, held at the Hotel Somerset in Boston, Mass., on March 14, heard two interesting technical papers delivered, respectively, by Robert H. Walsh, of the Rubber Laboratory, E. I. du Pont de Nemours & Co., Wilmington, Delaware, and H. R. Thies, Manager, Plastics & Coating Department, Chemical Products Division, Goodyear Tire & Rubber Co., Akron, Ohio.

In addition to the two scheduled speakers, a short address was delivered by Harry Outcault, of the St. Joseph Lead Co., who is vice-chairman of the Rubber Division, A.C.S., and liaison officer between the local rubber groups sponsored by the Division. Mr. Outcault stated that the Rubber Division is the largest division of the parent society, and emphasized the fact that it was interested in full cooperation with all sponsored local groups.

During the meeting it was announced that the usual summer outing will be held this year on Friday, June 27, at the Woodland Golf Club, Newton, Mass., the site of the last few outings. Owen Brown (Cabot) was named chairman of the Outing Committee, to be assisted by H. Sutton (Boston Woven Hose) and H. Atwater (Hood Rubber).

Walsh on Neoprene Latex

Mr. Walsh, the first speaker, delivered an address on "Applications for Neoprene Latex." Pointing out that the properties of neoprene latex showed conclusively that it could not be considered as a mere substitute for rubber latex, but rather as a new and unusual basic latex upon which to build an ever-expanding field of uses, Mr. Walsh described the various neoprene latices and their properties, characteristics and recommended uses.

Included among specific products covered by the speaker were dipped goods, extruded latex thread, balloons, latex foam, latex-treated curled hair and latex-sprayed fibers, paper and fiber saturants, and rug backing. Mention was also made of some experimental work, such as the addition of a colloidal silica to neoprene latex to produce a compound unusually well suited for bonding glass fibers.

Mr. Walsh also discussed some of the tests used at the DuPont Rubber Laboratory to compare the characteristics of neoprene and rubber latex, particularly the DuPont Vertical Tube Method and the Horizontal Burning Test used to compare the flame resistance of the two materials. Results of such tests were outlined. The speaker also showed numerous samples of neoprene latex products. (EDITOR'S NOTE: Mr. Walsh's paper will be reproduced in full in an early issue of RUBBER AGE).

Thies Discusses Pliolite

Taking as his subject "Pliolite Copolymer Resins and Their Uses," Mr. Thies, the second speaker, discussed the properties of Pliolite, the cyclized rubber-resin developed by Goodyear, and reviewed the history of its use for reinforcing rubber. He also presented data on a new family of copolymer resins based on butadiene and styrene. The members of this family, designed for rubber reinforcing, are known as Pliolite S-6.

Pliolite S-6, according to Mr. Thies, has a number of specific advantages for use in rubber compounding. It reinforces both GR-S and the nitrile type rubbers; increases stiffness, hardness and flex life; improves processing, and has excellent electrical properties which make it a valuable component in wire insulation and other electrical properties. The results of numerous tests bearing out these claims were shown by slides, with brief commentaries on each.

In connection with improvement in processing, the speaker said that at elevated temperatures Pliolite S-6 apparently acts as a plasticizer. This, it was emphasized, makes possible such jobs as the extrusion of thin walled wire insulation, accurately centered, and of uniform wall thickness. (EDITOR'S NOTE: Mr. Thies' paper is reproduced in full elsewhere in this issue).

Chicago To Hear Moulton

The next meeting of the Chicago Rubber Group will be held on Friday, May 9, at the Morrison Hotel in Chicago, Ill. The principal speaker at the meeting will be M. Scott Moulton, of the B. F. Goodrich Chemical Co., Cleveland, Ohio, who will talk on "Geon-Hycar Polyblends." Mr. Moulton will discuss the use of Geon in conjunction with Hycar to obtain new and improved properties not possible with either material alone. The meeting will also feature the election of officers for the coming year. A talk on sports will also be given.

CHICAGO HEARS SHATTUCK TALK ON RUBBER-TO-METAL BONDING

Robert Shattuck, vice-president of the Marbon Corp., Gary, Ind., was the principal speaker at the meeting of the Chicago Rubber Group, held at the Morrison Hotel in Chicago, Ill., on March 21. Mr. Shattuck spoke on "Bonding of Rubber to Metal with Ty-Ply." Two sound movies furnished by the Firestone Tire & Rubber Co., one an animated cartoon entitled "Building a Rubber Tire," and the other on "The 1946 Indianapolis Speedway Race," were also shown.

In his talk, which was illustrated by slides, Mr. Shattuck first described the characteristics necessary for a good adhesive. He said that a good adhesive should be as simple to apply as a coat of paint, suitable for use in a conventional rubber cure, versatile enough for use with a wide range of stocks of various hardnesses, have high bond strengths at both high and low temperatures, and have permanency of adhesive film location.

The speaker then dealt with the use of Ty-Ply Q for non-oil resistant rubbers, such as natural rubber and GR-S, and Ty-Ply S for oil resistant materials, such as neoprene and the nitrile rubbers. The preparation and application of the adhesive was covered in detail, as was the preparation of the metal and the compounding of the rubber stock which is to be bonded to the metal. A desirable property of the Ty-Ply bond is that the strength at curing temperatures is high enough to permit easy removal from a hot mold, Mr. Shattuck declared.

Author's Correction

John McGavack, author of the paper "Minor Element Content of Rubber and Rubber Plants," published in the February, 1947, issue of RUBBER AGE, failed inadvertently to list Dr. C. E. Rhines as helpful in its production. He takes this method of gratefully acknowledging this aid.

View of a group at the meeting of the Northern California Rubber Group, held at Angelo's Restaurant in Emeryville, Calif., on March 20, left to right, George Petelin (Goodyear Rubber); Bill Elwell (California Research Corp.); Joseph W. Crosby (Thiokol Corp.); and E. E. Gullekson (California Research Corp.), principal speaker of the evening.

Saga of Fiberglas Insulation

How a change-over from Class A to Fiberglas insulation can frequently enable electrical equipment to stand up under unusually severe operating conditions is demonstrated by the experience of the Baldwin Rubber Company, Pontiac, Michigan.

Angus McDonald, chief engineer of Baldwin Rubber, was confronted during the war period with the necessity of obtaining 750-hp from a 500-hp, 120-rpm, 5000-volt synchronous motor employed to drive two Banbury mixers originally used in mixing natural rubber. For this purpose, 500-hp was sufficient, but when Buna S had to be mixed 750-hp was required to achieve the same output and efficiency.

There was no room in the plant for a 750-hp motor, and no such motor was available. It looked as though the only solution was to drop one of the mixers, reducing output by nearly a half at a time when maximum production was urgent. Fortunately, Baldwin's chief engineer arrived at a happier solution—by replacing the motor's original Class A insulation with a Fiberglas rewind. The Fiberglas-rewound motor has been in operation almost 3 years without failure. During the war the motor operated under a 750-hp load for 12 hours a day, 7 days a week.

Sierra Rubber Assets for Sale

The assets of the Sierra Rubber Co., 2472 East 8th St., Los Angeles 21, Calif., amounting to $326,511, have been offered for refinancing or sale in bankruptcy proceedings of the company. Either transaction must be completed prior to May 1, 1947. Containing 47,000 square feet of floor space, the company's plant consists of fourteen corrugated iron buildings situated on four acres of land, including two warehouses, a mixing room, mill room, grinding room, laboratory, boiler room, pump room, press room and various storerooms. Machinery and equipment owned by the company include a new No. 3 Banbury mixer, five Farrel-Birmingham mixers, three tubers, grinding machines, and thirty hydraulic presses of various sizes. George T. Goggin, 354 South Spring St., Los Angeles 13, Calif., has been named receiver of the company.

Russia Denies Rubber Reparations

General F. Kominsky, Russian commander in the Leipzig area, recently denied in an interview with a correspondent for the *New York Times* that the Russians were seizing as reparations the Buna plant near Halle, Germany. The General said the Russians were taking only 8 or 9% of the output of the plant for the needs of occupation troops, and the balance was staying in German economy. According to Buna representatives at the recent Leipzig Fair, the Halle plant, which was created in 1938, has now reached production figures greater than at the height of the war.

Reports on Rubber Problems

During the past several years the Technical Advisory Service of the Smaller War Plants Corporation invited and received thousands of technical problems from industry at large. These problems ranged from the lamination of plastics to the manufacture of satisfactory synthetic rubber cements. Answers to the problems submitted were furnished by various sources and the composite answer eventually furnished to the original inquirer.

SWPC has now made these questions-and-answers available in the form of individual reports, any of which can be secured without charge by addressing the Technical Advisory Service, Smaller War Plants Corp., Washington, D. C. A number of reports covering rubber problems are listed below, the figures in parentheses being the report numbers:

1. Substitute for Elastic Web and Latex Rubber Compound for Rupture Appliances (2-134).
2. Is High Frequency Curing of Hard Rubber Feasible? (3-161).
3. Expected Life of Rubber Ribbon Thread (4-104).
4. Rubber Substitute for Lining in Electroplating Tanks (7-117).
5. Synthetic Rubber for Dental Polishers (7-137).
6. Is Rubber Dust from Natural or Synthetic Rubber Toxic? (7-234).
7. Information on Recovery of Waste Liquors and Rubber Reclaiming Process (9-177).
8. Method to Manufacture Extruded Synthetic Rubber Cord Using Buna S and Neoprene (11-117).
9. Dipping of Neoprene, etc., for Rubber Gloves, etc. (10-126).
10. Cement Flat Rubber to Steel Plate Subjected to Constant Dipping in a Water and Oil Solution (11-147).
11. Rubber Dies for Forming and Blanking (3-408).
12. Latest Development in Vulcanizing and Recapping Heavy Tires (3-588).
13. Material to Blend with Rubber so as to Stabilize It at Low Temperature without Reducing Flexibility and Tackiness (15-590).
14. Satisfactory Plasticizer for Synthetic Rubber (15-591).
15. General Information on the Fabrication of Neoprene (14-192).
16. Various Flexible Mold Materials and Technique to Form Plaster Casting (7-765).
17. The Manufacture of Sponge Rubber (7-663).
18. Methods of Transferring Neoprene Latex and Similar Products from Drums to Mixing Kettles (1-304).
19. Cement to Hold a Rubber Gasket in Place on Galvanized Iron (12-101).
20. Cementing Sheet Rubber to Steel or Brass Plate (7-589).
21. Cementing Seams of a Resin Coated Material Used for Water-Tight Sleeping Bags (1-310).
22. Suitable Gum to Be Used on Coated and Bond Papers and Applied with Printing Press (15-581).

Tygoflex 60 Thermoplastic

A new liquid formulation of 100% solids content containing no volatile solvents, reducers, or thinners has been developed by the U. S. Stoneware Co., Akron, for dipping, molding, casting, or coating purposes. Called Tygoflex 60, the material is said to convert by heat (350° F. to 380° F.) to a tough flexible thermoplastic resembling in appearance and physical characteristics a glossy rubber compound of medium hardness. The manufacturer claims that the new formulation offers the following application possibilities: as a solution to form products by dipping, utilizing any type of heat resistant form; as a molding compound where the material can be formed at low pressures; as a casting material which can be poured into a mold and cured by subsequent heating; as a material for the production of supported or unsupported films by knife, roller coating, or the usual spreading techniques. Tygoflex 60 is said to show excellent chemical resistance, good electrical properties, and wide color possibilities.

Powder Reduces Static Electricity

A powder that can be blown into automobile inner tubes to reduce static shock and car radio static has been placed on the market by the U. S. Rubber Co. Realizing that rubber tires prevent discharge of static electricity to the ground, the company developed the powder for application in the inner tubes of tires. An air hose and a specially designed container are used to inject about one teaspoonful of powder into each tube after the tube has been deflated and its valve core removed. The powder tends to cling permanently to the walls of the tube for the duration of the tube's life, modifying the electrical behavior of the tire and tube to eliminate or greatly reduce static troubles.

Lower Rubber Changes Name

The name of the Lower Rubber Division of the Chamberlain Engineering Co., Ravenna, Ohio, a subsidiary of the U. S. Stoneware Co., has been changed to the Columbia Rubber Co. An expansion program to increase the physical facilities of the company by 50% by the fall of 1947 has been launched. Robert L. Schroy, associated with the Firestone Tire & Rubber Co., Akron, for the past eleven years, recently joined Columbia Rubber as director of sales activities.

United Carbon Votes Split

Directors of the United Carbon Co. voted on March 2 at Charleston, W. Va., to split the company's common stock, two shares for one. The company plans to issue the additional shares about May 15, 1947, to holders of record as of May 1.

An Index to Vol. 60 of RUBBER AGE will be found in this issue.

LACROSSE RUBBER REACHES ITS FIFTIETH ANNIVERSARY

The current year marks the fiftieth anniversary of the LaCrosse Rubber Mills Co., LaCrosse, Wisconsin. Established in a wooden building in August, 1897, as a rubber clothing manufacturer, LaCrosse Rubber developed satisfactorily for a period of years, but because of changing market conditions it was decided in 1906 to turn over the facilities of the factory to the manufacture of rubber footwear.

The next six years was a critical period in the development of the company. Failure sometimes threatened the progress of the young concern because of numerous technical problems and the lack of experienced personnel. In 1912, Albert P. Funk and Arthur S. Funk, two sons of one of the leading stockholders, were placed in charge of the business as secretary and general manager, and treasurer and assistant general manager, respectively. Under their management the company's production and finances immediately improved.

As production expanded so did floor space, until the plant's original wood structures were replaced by modern fireproof buildings. From 1913 to 1916, it was necessary to construct two four-story reinforced concrete buildings, increasing the company's production by approximately 100%. While most rubber footwear manufacturers were obliged to materially curtail production during the depression year of 1921, LaCrosse Rubber found it necessary to increase its plant as well as production.

The company's large warehouse was erected during 1921 and the completion of the building released much needed floor space in the other manufacturing units. During the same year, the company constructed its laboratory for research and development work and improved its line of rubber footwear by installing pressure cure vulcanizers in its factory. Two years later, in 1923, another large four-story building, 210 feet long with 105-foot wings at each end, was constructed, and still another expansion program was launched in 1927.

In 1940, the management decided to install a modern conveyor system throughout the factory in order to increase production. Sales were increasing at the outbreak of World War II, when the lack of natural rubber and other materials forced a restriction in output.

Since 1942, steady improvement has been made in plant efficiency and in the personnel of office and factory. Leo J. Larkin is at present executive vice-president and general manager of the company.

The numerous products used in the manufacture of protective coatings featured by the Hercules Powder Co., Wilmington, Del., have been conveniently listed by the company in a new four page folder.

Morris Joins Eagle Rubber

H. B. Morris

H. B. Morris, formerly technical director of the Killian Manufacturing Co., Akron, has been appointed technical director of the Eagle Rubber Co., Inc., Ashland, Ohio. A graduate of Gettysburg College, where he received a degree in chemistry, Mr. Morris also attended Akron University and Johns Hopkins University. After being associated with the Firestone Tire & Rubber Co. in Akron and the Firestone Rubber & Latex Products Co. in Fall River, Mass., from 1931 to 1940, he left the Firestone organization to join the Naugatuck Chemical Division of the U. S. Rubber Co. In 1942, he enlisted in the Chemical Warfare Service of the United States Army, joining the Killian organization after his release in 1945.

Retardac 15A—Retarding Oil

A new retarding oil for scorchy stocks, which is said to be highly compatible with natural rubber, GR-S, or with blended mixtures of the two, has been introduced by the Wilmington Chemical Corp., 10 East 40th St., New York 16, N. Y. Known as Retardac 15A, the material may be used as a replacement for stearic acid to give high retention of tensile and elongation after aging. Slightly higher amounts of Retardac 15A, as compared with stearic acid, are recommended to provide optimum physicals and to gain improved raw processability. The material is reported especially suitable for increased black loadings and for processing the new slightly alkaline HMF blacks. It has a viscosity of 1000 to 2000 cps. at 24° C., a specific gravity of 0.97 to 0.99, an ash content of 2% to 4%, and an acid number of 125 to 135.

An index to Vol. 60 of RUBBER AGE will be found on Pages 125 to 128 of this issue.

GLASS CORD PASSENGER TIRES ARE BEING TESTED BY PHARIS

Pharis Tire & Rubber Co., Newark, Ohio, has produced and is testing passenger car tires containing glass cord. In cooperation with Owens-Corning Fiberglas Corp., special high strength glass cord fabric was manufactured and built into two-ply tires, which are said to be 40% stronger than four-ply rayon tires. The glass cord construction was 450/12/4.

The important advantages of Fiberglas over other cord materials are said to be its extreme high strength and resistance to heat. When certain problems in connection with coating and adhesion are solved, the glass cord tire is expected to be stronger than conventional tires. The 6.00 x 16 tires that were built by the company weighed three pounds less than its regular First Line tires in spite of their increased strength.

It is not economical to build the glass cord tire now, according to the Pharis company, since the cost of the Fiberglas fabric at $2.50 a pound is considerably higher than the price for cotton or rayon. While the results of endurance wheel tests on tires made of glass cord were not as good as those with cotton or rayon, Pharis intends to continue its experiments toward perfecting glass cord tires.

Acrysol GS Thickening Agent

Acrysol GS, a new product recommended for use as a thickening agent for synthetic and natural latex compounds formulated for dipped, cast and molded goods, as well as cements for combining rug backing and pile fabrics, and for shoe adhesives, was recently introduced by Resinous Products & Chemical Co., Philadelphia, Penna. The new product is the sodium salt of an acrylic polymer and is supplied as a 15% solution in water. It is said to have several advantages over Karaya gum and casein which are subject to bacterial degradation and hydrolysis. Because of its ability to maintain viscosities and its low degree of thixotropy, Acrysol GS is reported to be well suited for use in compounds which are applied by knife spreading, spraying, brushing, or extruding techniques.

Colwyn Medal to Martin

The Colwyn Gold Medal, awarded by the Institution of the Rubber Industry for outstanding services to both the Institution and the rubber industry in general, has been presented to George Martin, Superintendent of Investigations for the London Advisory Committee for Rubber Research (Ceylon and Malaya). Mr. Martin, who was closely associated with the rubber control activities of the British Ministry of Supply during the war, has been affiliated with the London Advisory Committee for some twenty-five years and is the author of numerous patents.

NAMES IN THE NEWS

LEE D. TIDBALL, staff superintendent of Akron Plant 4 of the B. F. Goodrich Co. since 1939, has been appointed staff superintendent of the company's industrial products manufacturing division, succeeding JOSEPH B. HANAN, who retired recently.

CHARLES W. KRIZAN has been named sales manager of the Karman Rubber Co., with headquarters at 12013 Twelfth St., Detroit 6, Mich.

MARC W. LAIBE, a member of the purchasing department of the Goodyear Tire & Rubber Co. for the past 22 years, most recently in charge of fabric purchasing, has been appointed assistant purchasing agent by the company.

GEORGE M. JENKINS, who has been in charge of off-the-highway tire sales in Akron for the Firestone Tire & Rubber Co. since 1942, has been named manager of the company's truck tire sales.

C. P. JOSLYN, formerly sales manager of the chemical products division of the Goodyear Tire & Rubber Co., has been appointed to the newly-created post of general manager of that division.

HARRY F. WEBSTER, vice-president and general manager of the Denman Tire & Rubber Co., has been named a director of the Second National Bank, Warren, Ohio.

MARTIN G. LEVENS, who has been connected with the sales department of the Columbia Chemical Division of the Pittsburgh Plate Glass Co. since his release from the Navy in 1946, has been appointed Cleveland, Ohio, sales representative of the Division.

ROBERT A. NISBET, who has been assistant general foreman in the silicone plant of the chemical department of the General Electric Co. for the past two years, has been appointed superintendent of the department's Waterford, N. Y., Works, which is now under construction.

A. M. FINLEY, research chemist and compounder for the mechanical goods division of the Goodyear Tire & Rubber Co. since 1929, has been appointed development manager of the company's mechanical goods plant at Lincoln, Nebraska.

DR. C. M. BLOW, formerly associated with the British Rubber Producers' Research Association of England, and more recently with the John Bull Rubber Co. as a research chemist, has rejoined the Association as head of the technological department. Dr. Blow is especially noted for his development of "Positex."

W. F. JESSUP, formerly chief of the wire mill branch of the copper division of the Civilian Production Administration, has joined the Cornish Wire Co., New York 7, N. Y., as sales manager of its cord division.

RUSSELL A. SPOONAMORE, who has been associated with the Goodyear Tire & Rubber Co. since 1930, serving in several overseas assignments, has been appointed vice-president in charge of production at the company's plant near Havana, Cuba, succeeding MARVIN A. RYAN, who has been transferred to the Goodyear plant in Sao Paulo, Brazil, as plant manager.

ELMER L. SPENCE, manager of the packing department of the U. S. Rubber Co., has been elected president of the Mechanical Packing Association.

KARL N. CARTER, who specialized on rubber-to-metal adhesion and molded rubber parts in connection with sales and development work on government projects during the war, has joined the Ohio Rubber Co. as manager of general sales, exclusive of the automotive and other accounts served by the Detroit, Mich., office of the company.

HENRY M. WILAND, who has been associated with the Goodyear Tire & Rubber Co. since 1924, most recently as a buyer in the purchasing department, has been appointed purchasing agent for the company's tire factory in Buitenzorg, Java.

ALFRED J. YARDLEY, who joined the firm of Jenkins Brothers, Bridgeport, Conn., in 1932, has been elected president of the company, succeeding his father, FARNHAM YARDLEY, who is now chairman of the board.

FRANK CLARK, well known in insulated wire circles and until recently factory manager of the Acorn Insulated Wire Co., is now acting as a consultant to the China Motor Corp., 120 Wall St., New York, N. Y., on the design and construction of insulated wire plants in foreign countries, particularly China.

RAYMOND F. CLARK, formerly associated with the Owens-Corning Fiberglas Corp. has joined Hess, Goldsmith & Co., Inc., New York, as head of the company's newly-formed industrial fabrics division.

JAMES N. MASON, formerly vice-president in charge of manufacturing for the O'Sullivan Rubber Corp., Winchester, Va., has been elected executive vice-president of that company.

Organic Chemical Intermediates

Two organic chemical intermediates—2-amino ethyl sulfuric acid. a white crystalline material of extremely high purity, and Rhodanine (2-thio-4-keto-thiazolidine), a heterocyclic compound containing a reactive methylene group—are being offered for the first time as commercial materials by the B. F. Goodrich Chemical Co., Cleveland, Ohio. Rhodanine reacts readily with aromatic aldehydes and the resulting derivatives are reported useful as intermediates for the manufacture of arylamino acids, arylthiopyruvic acids, arylacetonitriles, and arylethyl amines, while 2-amino ethyl sulfuric acid is expected to find wide usage as an intermediate in the preparation of heterocyclic nitrogen compounds.

C. A. GOETZ, formerly vice-president of the Cardox Corp., has joined the Brunswick-Balke-Collender Co. as director of engineering, with headquarters at Chicago. JAMES FITZGERALD, employed at the Muskegon, Mich., plant for the past six years in a research and development capacity, has been named assistant chief chemical engineer.

WILLIAM R. HARTMANN, formerly with the Flintkote Co. and prior to that connected with the U. S. Rubber Co. has joined the technical sales staff of the Barrett Division of Allied Chemical & Dye Corp.

GLENN W. GREEN, associated with the Duquesne Light Co. as laboratory superintendent prior to the war, has joined the Columbia Chemical Division of the Pittsburgh Plate Glass Co. as Chicago sales representative.

EDWARD R. MARTIN, formerly associated with the General Cable Corp. recently joined the Accurate Insulated Wire Co., New Haven, Conn., as chief chemist.

MORRIS COLMER, until recently with the Acorn Insulated Wire Co., is now factory superintendent for Cords Ltd., Inc., Newark, N. J.

ROBERT B. LITTLE, formerly sales manager of the Davol Rubber Co., Providence, R. I., has been named vice-president in charge of sales of that company.

FRED W. SMITH, formerly associated with the B. F. Goodrich Chemical Co., recently joined the Automotive Rubber Co., Inc., Detroit, Mich., as chief chemist.

HARRY B. SOULEN, vice-president and factory manager of the Mansfield Tire & Rubber Co., Mansfield, Ohio, has been elected president of the Mansfield Chamber of Commerce.

OSCAR HELFER, formerly New York district manager for the Seiberling Rubber Co., has been appointed to the newly created position of director of sales operations by the company.

Publicize Report on A.C.S.

A report on the aims and structure of the American Chemical Society, prepared by John M. Hancock, partner in Lehman Brothers, investment bankers, at the request of the Board of Directors of the Society, was made public at a luncheon given by the Society for Mr. Hancock at the Hotel Commodore in New York City on March 7. The report proposes several changes in the structure of the Society to meet modern needs, among them being the following: reduction in the size of the National Council from 506 members to approximately 300; simplification of the machinery for electing the president and other officers; establishment of an independent office of business manager and controller to take over some of the duties now performed by the secretary; creation of a full-time officer of treasury. The report will be submitted to the Board of Directors for action during the Society's 111th National Meeting at Atlantic City, N. J.

Double Eagle Premium Tire

A new premium passenger car tire constructed of all nylon cord which is said to give the tire 60% more strength than the best cord previously used has been introduced by the Goodyear Tire & Rubber Co., Akron. Identified as the Double Eagle, the new tire is the postwar version of the company's established premium line which was suspended during the war. Added qualities are incorporated in the tire through building the casing with six plies of nylon, which are said to lighten substantially the tire's weight while giving it greater strength and higher heat resistance. Because of the scarcity of nylon material, the new tire will be manufactured by the company for the present in the larger car sizes only, including the 7.00-15, 7.00-16, and 7.50-16.

Safety Council Board Meets

A meeting of the executive board of the Rubber Section, National Safety Council, was held in Akron on January 31, with Roland Kastell (U. S. Rubber) presiding. At the meeting, George Burkhardt (General Tire), chairman of the engineering committee, reported that work is nearly completed on a binder of standard practice forms for the rubber industry. The executive committee instructed F. A. Van Atta, staff representative of the Council, to draw up plans for dividing the Rubber Section Safety Contest into several groups, based upon the size of the companies entered.

Launches Expansion Program

Construction of four new buildings at a cost of approximately $400,000 has been started by the Marbon Corp. at its plant in Gary, Indiana. The additional plant capacity is designed primarily to increase the company's production of synthetic resins.

New Use for Pressure Zipper

The Pressure Sealing Zipper, the unique device of rubber and metal developed by the B. F. Goodrich Co., Akron, is currently being used to seal sections

of the supercharger air ducts on the Republic XF-12, four-engine army photographic plane, with a 4,000 mile range and speeds above 450 m.p.h. The application is illustrated in the accompanying photograph. Twelve of the special units are required for the plane, three from each of the supercharger ducts to the four 28-cylinder engines.

Los Angeles Hears Howlett

R. M. Howlett, of the technical service department of the Enjay Co., New York City, was the principal speaker at the April Meeting of the Los Angeles Rubber Group, held at the Mayfair Hotel in Los Angeles, Calif., on April 1. Other features of the evening included a talk by Richard Atkinson on "Russia—Past and Present" and the presentation of a film entitled "Oil from the Earth." In his talk on "Butyl Rubber," Mr. Howlett discussed the numerous applications and production of butyl as well as the advantages of butyl over natural rubber.

Philadelphia Meets May 16

The next meeting of the Philadelphia Rubber Group will be held on Friday, May 16, at Kugler's Restaurant in Philadelphia, Penna. The principal speakers at the meeting will be Dr. W. R. Smith and B. A. Wilkes, chief research chemist and technical sales representative, respectively, of Godfrey L. Cabot, Inc., Boston, Mass. Their subject will be "Recent Advances in Carbon Black Technology and Their Applications to the Rubber Industry."

January Hits Consumption Peak

Rubber consumption during January set a new monthly peak, according to the Rubber Manufacturers Association, reaching 102,739 long tons, of which 45,372 tons were natural and 57,367 tons were synthetic rubber. The amount consumed was 11.4% above December, 1946, and 32.8% above January, 1946. Consumption of reclaimed rubber amounted to 26,061 long tons, an increase of 10.4% over the previous month.

German Machine Tool Exhibit

A month-long exhibit and demonstration of outstanding German machine tools is scheduled to be held at the Frankford Arsenal in Philadelphia, Penna., from March 31 through May 2 for representatives of American industry, particularly the machine tool industry. The items to be displayed include various types of grinding, rolling, and milling machines, measuring and testing apparatus, and plastics processing equipment. The tools range in weight from a few pounds to tons. Prospective visitors are requested to notify Carl O. Hoffman, Chief, Materiel Unit, Technical Industrial Intelligence Division of Technical Services, Department of Commerce, Washington 25, D. C., of the date on which they plan to attend.

Scrap Rubber Institute Meets

The annual meeting of the Scrap Rubber Institute, a division of the National Association of Waste Material Dealers, Inc., was held at the Hotel Sherman in Chicago, Ill., on March 19th. in conjunction with the 34th Annual Meeting of the Association. Subjects of general interest were discussed, including synthetic rubber and its effect on the scrap rubber industry, the present export market, and closer cooperation with the reclaiming industry. The following officers were elected for the 1947-48 season: *President*, James K. McElligott (Loewenthal Co.); *Vice-President*, Nathan Lakin; *Secretary-Treasurer*, Clinton M. White.

Organize Ovens for Industry, Inc.

Ovens for Industry, Inc., with offices and plant located at 2032 West 105th St., Cleveland 2, Ohio, was recently organized. The scope of operations of the new firm will cover equipment for the rubber industry in a number of classifications, including drying ovens, curing ovens, preheating ovens, spreader systems, dryer rooms, and laboratory ovens for both drying and controlled humidity. Dwight M. Wilkinson, formerly chief engineer of Industrial Ovens, Inc., is president of the new company.

Huber Moves General Offices

The Industrial Products Division of the J. M. Huber Corporation is now located at 342 Madison Avenue, New York 17, N. Y. The Ink Division of the company is now located at the factory in Brooklyn, N. Y., the company having completely given up its former quarters on West 34th Street. The Industrial Products Division handles carbon blacks, chemicals and clays.

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FINANCIAL NEWS

SEIBERLING RUBBER COMPANY REPORTS NET OF $1,124,141

Net income of $1,124,141 has been reported by the Seiberling Rubber Co. for 1946, after deducting all charges, adjustments, an allowance of $182,212 for depreciation, and a provision of $640,000 for Federal income taxes. After allowing for payment of all dividends for the year on outstanding preferred stock, this was equal to $3.00 a share on the common stock, which compares with a net of $504,882, or $1.33 a common share, for the preceding year. Consolidated net sales for the year amounted to $30,516,556, an increase of 16.08% over net sales of $26,288,523 reported for the preceding year.

A statement accompanying the report reveals that the company spent $1,427,850 during the year as part of its post-war expansion program, the last third of which is expected to be completed during 1947. Substantial additions in machinery and equipment were made at the leased heel and sole plant at Carey, Ohio. Completion of the expansion program is expected to more than double the company's pre-war productive capacity.

The company's refinancing program, which was launched early in 1946, resulted in the sale of 35,000 shares of new 4½% prior preferred stock and retirement of $1,300,000 in fifteen-year debentures and $737,800 in outstanding shares of $2.50 prior preference issue. Common shares were increased 3,071 through conversion of 1,229 shares of the prior preference issue.

Dividends totaling $444,206 were declared during the year, which is equal to $3.32½ per share on the company's 4½% prior preferred stock, $5.00 a share on Class A preferred stock, 75c per share on common, and 63c on the now retired $2.50 prior preference issue.

The consolidated balance sheet of the company and its wholly-owned subsidiaries as of December 31, 1946, shows current assets of $9,691,338, including $1,070,481 in cash, $3,870,343 in accounts receivable, and $4,608,574 in inventories. Current liabilities are reported as $3,569,359, including $2,044,646 in accounts payable, $669,151 in Federal income taxes payable, and $541,926 in accrued liabilities. Working capital was increased $910,816, amounting to $6,121,979 at the year's end. Surplus was increased $486,409 to a year-end figure of $4,681,177.

I. B. Kleinert Rubber Co.

For 1946: Net profit of $387,329, which is equal to $2.40 a share, and which compares with $236,848, or $1.46 a share, for the preceding year.

Hewitt-Robins, Inc.

For 1946: Net income of $471,452, after deducting $222,078 for Federal income and excess profits taxes, which is equal to $1.69 each on 278,714 capital shares, and which compares with $641,020, or $2.30 each on 278,714 capital shares, of the previous year when $462,000 was deducted for Federal income and excess profits taxes. Net sales amounted to $15,426,415 as compared with $14,403,458 for 1945. As of December 31, 1946, current assets stood at $8,239,634 and current liabilities totaled $3,137,925, against $5,900,622 and $1,867,471, respectively, at the end of 1945.

American Cyanamid Co.

For 1946: Net income of $8,692,881 after a deduction for Federal and foreign income taxes of $4,900,000, which is equal to $2.92 per common share, and which compares with $6,213,054, or $2.02 per common share, in 1945 when $2,600,000 was deducted for Federal and foreign income taxes. Net sales amounted to $178,952,811 as compared with $159,053,405 for the previous year.

American Wringer Co.

For 1946: Net profit of $602,073, after deducting tax charges of $440,823, but including a credit for tax refund of $383,948, which is equal to $2.17 a share, and which compares with $1.78 a share earned in 1945.

National Rubber Machinery Co.

For 1946: Net profit of $333,941 after deducting $85,000 as a contingency reserve, which is equal to $2.17 a share, and which compares with $614,503, or $3.99 a share, for the previous year.

St. Joseph Lead Co.

For 1946: Net income of $5,807,131, which is equal to $2.94 a share, and which compares with $4,829,814, or $2.44 a share, for the previous year.

Raybestos-Manhattan, Inc.

For 1946: Net profit of $1,651,188, which is equal to $2.63 a share, and which compares with $1,533,968, or $2.44 a share, for the previous year.

Garlock Packing Co.

For 1946: Net income of $979,187, which is equal to $2.33 a share on 418,500 shares, and which compares with $831,071, or $1.98 a share, for the preceding year.

Intercontinental Rubber Co., Inc.

For 1946: Net income of $135,629, after provision of $74,754 for Federal and foreign income taxes, which compares with $398,476 for 1945 when $218,011 was deducted for Federal and foreign income taxes. According to a statement accompanying the report, 6,500 acres of guayule had been planted by the company by the end of the year. It is expected that an additional 3,000 to 3,500 acres will be planted by mid-summer of 1947. During 1946, the company produced 8,587,200 pounds of guayule rubber, while 31,029 metric tons were shrub milled. The consolidated balance sheet as of December 31, 1946, indicates total current assets of $1,797,852, including $414,805 in cash, $812,000 in U. S. Treasury bonds, and $238,675 in inventories, and total current liabilities of $204,579, including $70,079 in accounts payable and $79,500 as a reserve for U. S. income taxes. The report covers the parent company and its subsidiaries.

American Hard Rubber Co.

For 1946: Net income of $207,686, after deducting charges, Federal income taxes, a $43,181 loss on sale of property, and $40,000 for contract refunds, which is equal to $10.73 each on 19,344 shares of $7 preferred stock, and which compares with a net loss of $159,167 for 1945. Net sales amounted to $13,624,977 as compared with $11,959,276 for the preceding year. Dividend arrears on the company's preferred stock as of December 31, 1946, amounted to $5.25 a share. The company is expected to be in a position to resume dividends on its preferred stock this year.

Mansfield Tire & Rubber Co.

For 1946: Net income of $1,960,584, of which $1,300,000 was expended during the year for additions to buildings and plant equipment. Common stock dividends at $2 per share amounted to $317,864 with $30,490 paid on preferred issues at the rate of 30c a share. Gross sales amounted to $41,554,523. As of December 31, 1946, net current assets totaled $5,177,480 as compared with $4,618,209 at the end of the preceding year.

Dayton Rubber Mfg. Co.

Year Ended October 31: Net profit of $2,101,524, which is equal to $4.43 a common share, and which compares with $431,466, or 75c a share, for the preceding fiscal year.

Jefferson Lake Sulphur Co.

For 1946: Net profit of $367,613, which is equal to 80c each on 354,500 common shares, and which compares with $359,333, or 79c each on 349,500 common shares, for the previous year.

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GENERAL TIRE & RUBBER CO. REPORTS NET OF $5,734,955

Consolidated net income of $5,734,955, after deducting all charges including $3,971,982 for Federal and foreign taxes and $1,043,939 for depreciation, has been reported by the General Tire & Rubber Co. for the fiscal year ended November 30, 1946. This is equal to $9.05 a share on the common stock and compares with a net of $1,607,543, or $2.20 a common share, earned during the preceding fiscal year.

Net sales aggregated $105,883,559, an increase of 21.57% over the previous peak of $87,105,111 reached in 1945. Excluded from the net sales figure for 1946 are the sales of the Aerojet Engineering Corp., in which the company has a majority interest, the Mansfield Tire & Rubber Co., in which General Tire has a substantial minority interest, and the company's foreign affiliates, in which it has minority interests.

According to a statement accompanying the report, the company's radio operation, the Yankee Network, Inc., and its foreign operations in Mexico, Canada, Chile, Venezuela, and Portugal proved highly successful. The Portuguese plant, which was opened in April, 1946, produced over 30,000 passenger car tires by the end of the fiscal year. The company plans to continue its research arrangements with Purdue University, Carnegie Tech, and Notre Dame University, as well as its rocket program with California Tech.

The consolidated balance sheet as of November 30, 1946, indicates total current assets of $43,275,073, including $6,061,517 in cash, $15,634,823 in notes and accounts receivable, and $21,578,733 in inventories. Total current liabilities are reported as $22,218,038, including $5,034,230 in notes payable, $9,120,393 in accounts payable, $4,998,493 in accrued Federal and foreign income taxes, and $1,516,556 in other accrued taxes. Working capital at the end of the current fiscal year amounted to $21,057,035 as compared with $14,550,584 at the end of the preceding fiscal year.

Columbian Carbon Co.

For 1946: Net income of $5,307,861, which is equal to $3.29 a share, and which compares with $3,352,008, or $2.08 a share, for the previous year. Income for 1946 included $219,876 profit on sale of securities. Sales totaled $34,363,005, against $27,244,318 in 1945. Carbon black production by the company amounted to 266,272,195 pounds, excluding 31,000,000 pounds produced under Columbian management for associated companies. Net working capital on December 31, 1946, was $11,749,202, as compared with $10,922,396 at the end of the previous year.

Mansfield Tire & Rubber Co.

For 1946: Net income of $1,960,584. A common stock dividend of $2 a share and a preferred stock dividend of 30c a share have been declared.

Wartime Rubber Use

A new wartime use for rubber has been discovered in Java. Elaborate breastworks and pillboxes, built and cleverly camouflaged by the Japanese during their occupation of the Dutch East Indies, were constructed of bales of natural rubber. This rubber is being recovered, according to a recent report received by the Goodyear Tire & Rubber Co. The effectiveness of the rubber barricades was never tested under shellfire, the Japs surrendering before the Allies had occasion to invade Java.

Moves Plant and Offices

Pioneer Latex & Chemical Co. has moved its plant and offices from Newark, N. J., to Lincoln Boulevard, Middlesex, N. J. The new plant, consisting of approximately 30,000 square feet of floor space, with a twelve-car railroad siding located on about three acres of ground, will house both the rubber and bituminous divisions of the company as well as the main offices and research laboratory. The new facilities will enable the company to produce about 20,000,000 gallons of natural and synthetic rubber latex compounds, rubber adhesives, mastic flooring, emulsified asphalts and resins, cutbacks, Gilsonite solutions, sewer joint compounds, waterproofing and dampproofing materials, tile cements, underlayments, acid resistant coatings, car cements, and a large variety of custom compounded products.

To Increase Tire Facilities

Expansion of tire manufacturing facilities at its Miami, Oklahoma, plant involving an expenditure in excess of $1,000,000 has been announced by the B. F. Goodrich Co. The increased facilities are expected to boost production approximately 16% over current output and to provide employment for about 150 to 200 additional workers. The new expenditures, making total cost of the plant more than $8,000,000, are earmarked for new equipment which will be installed by July 1. Completed in 1944, the Miami plant now employs more than 1,000 persons.

England Plans Rubber College

The British Ministry of Education will shortly establish a National College of Rubber Technology. The new college, which has the support of the Institution of the Rubber Industry, the Federation of British Rubber Manufacturers, and similar organizations will be housed at Northern Polytechnic, which for many years has operated the principal rubber school in England.

NET INCOME OF $3,045,421 REPORTED BY GENERAL CABLE

General Cable Corp. has reported a net income of $3,045,421 for 1946 after deducting all charges including $817,414 for depreciation and amortization and $1,125,000 for Federal income taxes. After allowing for $7.00 a share on the company's old preferred shares for the first six months of the year and $4.00 a share on new first and second preferred shares for the final six months, this was equal to $1.09 each on 1,898,614 common shares, and compares with a net of $2,569,543, or 43c each on 671,868 common shares, in 1945.

According to a statement accompanying the report, the company during 1946 acquired from the War Assets Administration certain plant properties adjacent to its existing plant at St. Louis, Mo., in order to improve distribution and integration of its manufacturing facilities. The acquisition was constructed and operated by General Cable during the war under a lease agreement with the Defense Plant Corp. In addition, the company rearranged facilities at all plants, including the new building and equipment at St. Louis, resulting in additional capacity.

The balance sheet as of December 31, 1946, indicated total current assets of $27,922,217, including $7,576,960 in cash, $2,000,000 in United States Treasury securities, and $10,208,371 in inventories, and total current liabilities of $6,754,142. Working capital amounted to $21,168,075 as compared with $23,308,220 at the end of the preceding year.

Thiokol Corporation

For 1946: Net loss of $55,427, after including a loss of $30,982 for patents and patent applications abandoned during the year because they were considered to be of no value, which compares with a net loss of $13,827 for the preceding year. The net loss was attributed by the company to strikes in its customers' plants, difficulty in obtaining sufficient quantities of raw materials, and slow acceptance of the company's new products in post-war uses and applications.

New American Standard Available

A new American Standard covering 163 letter symbols designed to give chemists and chemical engineers a uniform system of "shorthand" for use in mathematical calculations has been made available by the American Standards Association, 70 East 44th St., New York 17, N. Y. The new standard, designated as American Standard Z10.12, is available from the Association for 50c a copy.

Belden Manufacturing Co.

For 1946: Net profit of $765,311, which is equal to $2.62 each on 291,640 capital shares, and which compares with $402,403, or $1.52 each on 265,300 shares, for 1945.

Additional Technical Booklets

We have received five additional booklets from the Netherlands Rubber Institute, Delft, Holland, three in English and two in French, covering investigations made by the Institute during the past few years. Titles of the three booklets in English are: *The Vulcanization of Rubber with Phenol Formaldehyde Derivatives. I,* by S. van der Meer (Communication No. 47); *The Vulcanization of Rubber with Phenol Formaldehyde Derivatives. II,* by S. van der Meer (Communication No. 48); *On the Proportion of Crystalline and Amorphous Components in Stretched Vulcanized Rubber,* by A. J. Wildschut (Communication No. 51). The two booklets in French are: *Le Mecanisme de la Vulcanisation du Caoutchouc par les Derives Phenol-Formaldehyde,* by S. van der Meer (Communication No. 44), and *La Permeabilite aux Gaz des Substances Caoutchoutiques,* by G. J. van Amerongen. A few extra copies of these booklets are on hand and may be secured without cost on request to this journal.

Firestone Imperial Tire

Development of a new premium passenger car tire which contains nylon cord in the tread ply has been announced by the Firestone Tire & Rubber Co., Akron. Said to be the first passenger car tire to combine rayon and nylon, the new tire, called the Imperial, is reported to give more tread wear than pre-war premium tires. The company claims that the nylon tread ply concentrates additional strength under the center of the tread where impacts, punctures, and bruises are most likely to occur. Having one of the widest treads and flattest contours yet developed for passenger cars, the tire also contains two additional circumferential ribs that are said to assure a maximum in non-skid protection for motorists. Silent running and automatic pebble ejection are other important engineering features claimed for the tire. Now in production, the tire will have white sidewalls as soon as government restrictions are relaxed.

Renew Rubber Industry Reports

The first Rubber Industry Report to be issued by the Department of Commerce since November, 1942, was recently published. Prepared by the Rubber Unit of the Department, and bearing a March, 1947, date line, the report summarizes principal statistics relating to rubber through the war period and to the end of 1946, and provides background information. Future reports will provide more timely information and will contain occasional special features. The Rubber Industry Report will be issued bimonthly and subscriptions at 50c a year domestic and 75c a year foreign can be placed with the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Collins Joins Amecco

J. Gordon Collins

J. Gordon Collins, formerly manager of sales development for special chemicals of the Naugatuck Chemical Division of the U. S. Rubber Co., has been appointed vice-president and general sales manager of Amecco Chemicals, Inc., 60 East 42nd Street., New York 17, N. Y. After graduating from the Massachusetts Institute ot Technology in 1928 with a B.S. degree in chemical engineering, Mr. Collins was appointed to the staff training group of the Goodyear Tire & Rubber Co., Akron, where he specialized in reclaimed rubber. He was named chief chemist of the E. H. Clapp Rubber Co., Boston, Mass., in 1930. Three years later he joined the Naugatuck Chemical Division, specializing in technical sales development until 1942 when he was appointed sales manager for agricultural chemicals. Mr. Collins was appointed manager of sales development for special chemicals in 1946.

Uitenhage Unit in Production

Goodyear Tire & Rubber Co. has announced the start of production on a limited scale at its new factory in Uitenhage, South Africa. When it swings into full production stride, the new factory is expected to be one of the most modern rubber plants in the world. The plant consists of a tire and tube factory as well as a separate unit devoted exclusively to the manufacture of industrial rubber products. Formal opening of the plant will be held in June.

Production Starts at New Plant

Production is reported under way at the new plant of the Ohio Rubber Co. of California, Long Beach, Calif., a wholly owned subsidiary of the Ohio Rubber Co. Auto mats, automotive molded goods, and Air King tires are being manufactured at the new plant which contains approximately 100,000 square feet of floor space and employs about 200 persons.

Introduces Statex K Black

Columbian Carbon Co., New York, has announced the commercial development of Statex K, a new furnace carbon which is reported to equal or surpass standard channel black in road wear when used in either natural or synthetic rubber tires. The new black is produced by a new patented furnace process which is said to operate at over twice the efficiency of the existing channel method. A single Statex K furnace, occupying 400 square feet, is reported to produce as much carbon black as 35 of the old "channel houses" spread over 42,000 square feet. Closely approaching channel black in fineness of sub-division, Statex K is mildly alkaline in nature, moderate in development of reticulate chain structure, and because of surface characteristics is said to be superior to channel black in resistance to heat, aging and flex-cracking. Further details on the new furnace carbon will be found elsewhere in the feature pages of this issue.

Change New York Outing Date

The annual summer outing of the New York Rubber Group, originally scheduled for Friday, June 20, at Blasberg's Grove in Hawthorne, N. J., will be held on Friday, June 27, instead. The change was authorized by the Executive Committee of the Group to prevent a clash with the A.S.T.M. meeting to be held in Atlantic City, N. J., the week of June 16. The outing will not include golf, but the Group will sponsor a special Golf Tournament to be held on the first or second Thursday in August at some club in Westchester. A special Golf Committee has been appointed consisting of Jean Nesbit (U. S. Rubber Reclaiming), D. E. Jones (American Hard Rubber), Don Cranor (Binney & Smith), and E. B. Curtis (Vanderbilt). Further details on the tournament will be announced shortly.

Opens New Fan Belt Plant

The Superior Rubber Products Manufacturing Co., which maintains headquarters at 4041 Ridge Ave., Philadelphia 29, Penna., recently completed a new plant in Egg Harbor City, N. J. The new plant will enable the company to double its productivity and permit it to manufacture automotive fan belts as well as FHP V belts, which was its only product up until the beginning of this year. E. J. Zinnell is president and general manager of the company, M. B. Simon is vice-president, and E. D. Simon is secretary-treasurer.

Lift Export Controls on Tires

Removal of export controls on new and used passenger car tires has been announced by the U. S. Department of Commerce. The decision to decontrol tires was based on the great improvement in domestic production.

Data on Plane Material Tests

The results of German-conducted tests to determine the mechanical properties of rubber and plastics materials and light wood for stiffening airplane assemblies are contained in a report which has been made available by the Department of Commerce. The investigation of light materials was comprehensive, consisting of tests on laminated wood shavings, wood fiber, "Troporit," expanded "Polystal," polystyrene, and cellular rubber to determine tensile, transverse, compressive and sheer strengths, elasticity, specific impact strength, glueability, stability, and the influence of temperature on strength. Copies of the report, entitled "Strength and Hygroscopic Properties of Light Materials" (PB 48072), may be obtained from the Office of Technical Services, Department of Commerce, Washington 25, D. C., for $2 in photostat form and $1 in microfilm form.

Firms Get Scrolls from China

At a dinner given by the China Institute in America at the University Club in New York City on January 27, American firms which gave on-the-job training to Chinese sent to the United States during the war received the personal thanks of Chiang Kai-shek for "a contribution of far greater value than you perhaps realize toward helping us solve our vast reconstruction program." The messages which were printed on scrolls bearing the Generalissimo's "chop" were presented to an official of each firm by the Chinese Ambassador, Dr. V. K. Wellington Koo. Among those receiving the scrolls for their respective firms were: Dwight R. G. Palmer, President of the General Cable Corp.; L. C. Boos, President of the U. S. Rubber Export Co.; and Roger S. Firestone, of the Firestone Tire & Rubber Co.

Plymouth Rubber Offers Stock

A public offering of 300,000 shares of $2 par value common stock has been made by the Plymouth Rubber Co., Inc., Canton, Mass. The shares are being sold at $13.50 each for the account of a group of present stockholders. Capitalization of the company consists of 900,000 shares of $2 par value common stock. The company reported a net profit of $2,149,550 for the year ending November 30, 1946. Underwriters making the public offering include F. Eberstadt & Co., and E. W. Clucas & Co., both of New York City.

Polson to Erect Building

Polson Rubber Co. has been granted permission by the Civilian Production Administration to spend $47,100 for the construction of a processing unit at its plant in Garrettsville, Ohio. H. B. Polson is president of the company, which specializes in the manufacture of inner tubes.

Appointed Technical Director

Edward Hazlehurst

Edward Hazlehurst, who has been associated with the Western Electric Co. in an engineering capacity since the United States entry into World War II, and who was previously active in the coated fabric field, has been appointed technical director of the Pantasote Co., Passaic, N. J. Mr. Hazlehurst will make his headquarters at the company's plant in Passaic and direct all operations for Pantasote from basic research to product development and manufacturing processes. Before joining Western Electric, he was associated with Congoleum Nairn, Inc., for seventeen years. As chief chemist at the Congoleum plant in Kearny, N. J., he was responsible for the development of the first satisfactory linoleum adhesive, as well as the lighter weight and more flexible wall linoleum. Mr. Hazlehurst holds a B.S. degree from the University of Pennsylvania.

Lee-Tex Acquires New Building

Lee-Tex Rubber Products Corp. has acquired a new building in Chicago, Ill., to replace its plant which was recently destroyed by fire. It is expected that the production of the company's line of toy balloons and other novelties will be resumed in the near future. When the plant is ready for operation, the company claims that it will be the largest balloon factory in the world.

Acquires Singapore Concern

Cressonite Industries, Ltd., Singapore, Straits Settlement, has acquired the entire assets and liabilities of Singapore Rubber Works, Ltd. The Cressonite organization, which manufactures specification rubber goods, as well as latex articles, will fulfill all outstanding contracts entered into by the Singapore Rubber Works.

Lt. Col. Eaton Retires

Lt. Col. B. J. Eaton, well-known British chemist who has held prominent positions in research organizations of both rubber planting and manufacturing interests, has retired as secretary of the Research Association of British Rubber Manufacturers. Born in Dorchester, England, in 1883, Col. Eaton went to Malaya as a government chemist in 1906 and was appointed agricultural chemist four years later. After serving as head of the Chemical Division of the Rubber Research Institute of Malaya and later as director of the Institute, Col. Eaton retired in 1936. At the start of World War II, he left his retirement to assume the position of secretary of the Research Association of the British Rubber Manufacturers. He was awarded the Colwyn Gold Medal of the Institution of the Rubber Industry in 1941.

New Synthetic Rubber Developed

Development of a "super processing" synthetic rubber which is said to improve the appearance and production efficiency of many rubber products has been announced by the U. S. Rubber Co. The new rubber has not yet been named, but it is closely related to general purpose GR-S. It is reported to obtain its unusual properties from the addition of approximately one half of one per cent of a special cross-linking agent. Rubber boots and shoes, bathing caps, and other articles having a bright, shiny appearance and produced in white or any other color are possible with the new rubber, according to the company. It also improves the finish of tire sidewalls by reducing molding blemishes.

Starts New Research Center

Construction of a new research center has been started by the Carbide & Carbon Chemicals Corp. on part of a 140-acre plot recently purchased by the company about a mile from its South Charleston, West Virginia, plant. The new center will replace existing facilities and will eventually house the fundamental research activities of the company pertaining to new organic chemical and resin producing processes. Upon completion of the new center, the present research unit will provide additional process control laboratory facilities for the company's South Charleston plant.

Article on Hans Wyman

An article which appears in the April, 1947, issue of *Fortune* magazine tells how a new family industrial empire in plastic film, rubber goods, and synthetic textiles is being built in the United States by Hans Wyman, president of the Pantasote Co. Entitled "Hans Wyman 'Makes Big Businesses,'" the article describes the part played by Mr. Wyman and his family in the rapid expansion of Pantasote Co. and the H. O. Canfield Co. during the past few years.

LOS ANGELES NEWS

Again the Los Angeles Rubber Group, known to its members as "Tlargi," held a successful and well-attended meeting in the Rainbow Room of the Mayfair Hotel, on March 4.

After the usual dinner, the members settled down to one of their most interesting and informative meetings. But before the main speakers were introduced, Curtis R. Wolter (Naugatuck Chemical), Tlargi Chairman, dispensed with the preliminary business matters.

Mr. Wolter, who recently returned from an extensive trip throughout the Northwest, extended the regards of the Rubber Industry there. He then introduced the new members to the Group, and presented them with their membership cards and 1947 Yearbooks.

Tway W. Andrews (Royal) reported on the coming golf tournament to be held March 14th at the San Gabriel Country Club. Phil Drew (Goodyear), Associate Chairman of the Group, opened his remarks with one of his usually-amusing anecdotes, and then introduced one of the guest speakers, Lt. Elwin H. Lombard, USN.

Lt. Lombard related his experiences as an officer with the Combat Military Government. He was particularly qualified, having lived in Japan and later studying at Columbia University. His job was to care for and organize a military government for enemy civilians captured in the Pacific.

Lt. Lombard landed with the 1st Marine Division on Pelelieu, to find no civilians. Again on Iwo Jima there was only one civilian, quite dead. However on the invasion of Japan, Lt. Lombard was placed in charge of almost 50,000 displaced Koreans on the island of Kyushu.

The Lieutenant also served in MacArthur's civil government and expressed praise for the General's effective work there. On the island of Samoa, Lt. Lombard told of the Colonial Government set up by the Americans, which he found to be a model for other island administrations.

After a period of questions from the members, and a short recess, the meeting was convened for the introduction of Chief Bill Speedy, USN, who spoke on the Bikini tests.

Within the bounds of military security, Chief Speedy told of the vast preparations made for the dropping of the atom bomb. A fifteen minute film was also shown on both bombs dropped at Bikini, revealing some phases of the Operation not shown to the general public.

A Rubber Group member asked Mr. Speedy a very significant question: "What effect did the Bomb have on rubber equipment, both on the ships and on planes in that area?"

"As I understand it," Chief Speedy said, "the rubber materials suffered the least noticeable damage from the rays of the atomic explosion."

Both members of the Navy were thanked by the Group for their interesting talks.

Dr. Robert Matteson, chairman of the California Section of the American Chemical Society, has announced that the Pacific Industrial Conferences will run concurrently with the Pacific Chemical Exposition to be held in the San Francisco Civic Auditorium from October 21 to 25, 1947. The California Section will be host to 10 organized groups which have offered to provide the bulk of the program material for the Conferences by conducting one and two-day conferences on industrial applications of recent scientific developments. The Northern California Rubber Group is one of the 10 organizations involved.

Tires of steel, glass and wood chemicals were envisioned in the future in a talk recently given by Ira S. Shull, Pacific Coast Supervisor of Commercial Activities of the U. S. Rubber Co. at the annual convention of the Idaho Motor Transport Association in Boise, Idaho. Tire cord made of steel wire was said to have shown remarkable promise in laboratory tests and tires with such cord are now being produced on an experimental basis. Mr. Shull also stated that improvements in production techniques, plus added facilities, have enabled the Pacific Coast industry to produce almost twice as many tires as it did in pre-war days.

General Establishes Fellowships

Two pre-doctoral fellowships in chemistry have been established at the Carnegie Institute of Technology by the General Tire & Rubber Co., Akron. The fellowships, which will become available on July 1, 1947, will be granted on a competitive basis for research in polymerization and polymers fundamental in the study of rubber chemistry. No restriction is placed by General Tire on publication of the results of the research undertaken under the grants.

Rodic Rubber Moves Offices

Rodic Rubber Corp. has announced the removal of its general offices from Garwood, N. J., to Allen Ave., New Brunswick, N. J. The telephone number is New Brunswick 2-1011. The company specializes in the manufacture of mechanical rubber goods.

OBITUARIES

Robert F. Morse

Robert F. Morse, vice-president of the W. S. Libbey Co., Lewiston, Maine, died on January 24 in Bronxville, N. Y., after a prolonged illness. He was 48 years old. Born in Pittsfield, Maine, in 1898, Mr. Morse was graduated from Dartmouth College. He joined the Libbey organization in 1928, was appointed vice-president in charge of the company's Lewiston factory in 1932, and later was elected president of its New York subsidiary, W. S. Libbey Co., Inc. During World War II, Mr. Morse served as an executive of the War Production Board.

Ralph J. Andrews

Ralph J. Andrews, vice-president in charge of research for the Wilson Carbon Co., Inc., died on March 3 at Aruba, N. W. I. Graduated from Yale University in 1909, Mr. Andrews became well-known as an authority in the chemistry of carbon and metallurgy. He was a Mason, a member of the Yale Alumni Association, and the American Chemical Society. A widow and two sons survive.

Mrs. Walter L. Sturtevant

Mrs. Walter L. Sturtevant, wife of Walter L. Sturtevant, who retired recently after being associated with the Manhattan Rubber Division of Raybestos-Manhattan, Inc., for 34 years, died in the Passaic General Hospital in Passaic, N. J., on March 1. Born in Salem, Mass., Mrs. Sturtevant attended Boston University, where she received A.B. and M.A. degrees. She was active in several civic organizations in Passaic and was a member of the Passaic Board of Education.

William E. Brown

William E. "Bill" Brown, sales manager of the mechanical roll department of the American Wringer Co., Woonsocket, R. I., died at his home in East Greenwich, R. I., on December 26 at the age of 64. Associated with the company since 1902, Mr. Brown served in various sales capacities until he was appointed in 1927 to the position he held at the time of his death. A widow survives.

Naugahyde Shoe Material

A new type of laminated plastic sheeting has been developed by the U. S. Rubber Co. for use in the manufacture of shoes. Known as U. S. Naugahyde Shoe Material, the sheeting is reported to be practical for quarter linings, sock linings, heel pads, facings, and trim on shoes. It is available in the standard shoe colors and in .030, .025, and .020 gauges. The company claims that the sheeting is pliable, easy to form and apply; can be cleanly cut, showing no fraying at the edges; is not tacky; will not soften, stretch, harden or crack through use, and has sufficient strength to be free from stitch tearing. It can be easily printed or stamped, and the ink is said to be permanently imbedded in the laminated plastic sheeting.

Latex Compound No. 11846-8

Plasticon Corp., 841 East 43rd St., Brooklyn 10, N. Y., has developed a new adhesive material for laminating metal foils to paper. Known as Latex Compound No. 11846-8, the material is reported to offer no fire hazard, to be odorless and water repellent, and to remain flexible for an indefinite period of time. According to the makers, factory tests have shown that the use of this new compound will enable machines which laminate metal foil to paper to operate at about two or three times their present capacities. The compound is also said to provide a minimum amount of foam for this lick-roll operation, and its viscosity can be lowered by the addition of water.

New Velon Plastic Filament

A new ultra-fine Velon plastic filament has been developed by the Firestone Tire & Rubber Co., Akron, for weaving of soft-hand fabrics. The company claims that the finer filament will produce fabrics as soft as any yet made from extruded monofilaments, yet will have the stain-proof and fade-proof characteristics of other Velon materials. Most Velon filament is eight and twelve millimeters in diameter with a yardage of 4,000 to 8,000 per pound; the new filament is only five millimeters in diameter and has a yardage per pound of approximately 22,000. The company expects to offer the new filament to the textile industry during the second half of 1947.

Columbia Chemical Bulletins

A number of technical bulletins on the applications of the company's chemicals have been made available by the Columbia Chemical Division of the Pittsburgh Plate Glass Co., Fifth Ave., Bellefield, Pittsburgh 13, Penna. These bulletins include: *Caustic Soda* (A-102); *Soda Ash* (A-202); *Caustic Ash* (A-302); *Modified Sodas* (A-322); *Cleaner & Cleanser* (A-332); *Liquid Chlorine* (A-502); and *Sodium Bicarbonate* (A-602). Copies are available upon request to the company.

Completes Largest Casting

United Engineering & Foundry Co., Pittsburgh, Penna., has completed what is reputedly the world's largest steel machinery casting, weighing 472,000 pounds.

Mold used for casting

Made in the company's New Castle, Ind., plant, the casting is to be used as a frame for a 6000-ton capacity, high speed, mechanical forging press.

Offer Booklet on Benzene

The sixth and latest pamphlet of the Controlling Chemical Hazards series to be released by the Division of Labor Standards of the U. S. Department of Labor, Washington 25, D. C., is entitled "Benzene (Benzol)." The booklet contains information on precautions to be observed in handling drums, bottles and tank trucks; grounding and bonding methods to prevent ignition by static electricity; specifications for explosion-proof equipment, and safe operation of enclosed and partially-enclosed systems. Copies of the pamphlet are available on request to the Division of Labor Standards.

To Double Polyethylene Output

Carbide & Carbon Chemicals Corp. has launched an expansion program designed to double the wartime production of polyethylene resins at its South Charleston, West Virginia, plant. Present production at the plant, which is already six times the original rated capacity, is expected to be doubled when the expansion program is completed early in 1948. Polyethylene resin is marketed through the Bakelite Corp. a wholly-owned subsidiary.

Opens Boston Sales Office

United Carbon Co. has announced the opening of a New England district sales office at 302 United Building, 43 Leon St., Boston 15, Mass. The telephone number is Garrison 9529. William A. Maguire, who has been associated with the company for a number of years in the Akron sales territory, has been named manager of the new office. Mr. Maguire is a graduate of Brown University.

New Bowling Ball Feature

A new mechanical improvement on its A. B. C. Regulation Bowling Balls has been developed by the Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J. Known as the "Easy-Hold," the new development consists of bushing the thumb hole of the bowling ball with a rubber cushion. After a ball has been drilled to suit the individual's grip, the thumb or other finger holes are counterbored and a special rubber cushion of the same diameter is inserted. It is claimed that this cushion will protect the thumb from blisters and knuckle knobs and prevent slipping, yet releasing quickly and naturally.

New Film Forming Material

Dow Latex 512, a new aqueous film-forming material, which is said to hold special interest for the paint, paper, and textile industries, has been developed by the Dow Chemical Co., Midland, Mich. It is a combination of butadiene and styrene which when air dried is said to form a rubbery and tough film with excellent pigment binding properties and a high protective value. Its compatability with many aqueous emulsions or dispersions of resins, oils, varnishes, starches, waxes, casein, plasticizers, and water soluble gums and pigments, is cited by the company as another of its important characteristics.

Goodyear Expansion Under Way

A $1,850,000 modernization and expansion program, designed to assure continuous capacity operation of all tire production machinery, is under way at the Jackson, Mich., plant of the Goodyear Tire & Rubber Co. Principal phase of the over-all improvement plan is an addition to the plant's milling and compounding division to provide a steady flow of rubber stock for tire and tube production. The program, scheduled for completion in the spring of 1947, culminates a reconversion plan that began in 1944 with installation of facilities to increase tire and tube production 28% over the prewar level.

Rubber Project Appointments

Several appointments to the staff of the Natural Rubber Research Project, which is being conducted at Salinas, Calif., for the Office of Naval Research by the Stanford Research Institute, have been announced by the Institute. Andrew A. Nichol, who was chief of the Division of Surveys and Operational Investigation of the United States Forest Service Emergency Rubber Project during World War II, has been named Salinas director of the Project. Other members appointed to the staff include Dr. Harris M. Benedict, senior plant physiologist, Carl A. Taylor, research agriculturist, and Waldo B. Maher, chemist.

CANADIAN NEWS

Government control of rubber in Canada, except for price and export restrictions, ended at the close of business on March 31. With the announcement, Reconstruction Minister C. D. Howe forecast an improvement in the supply of natural rubber, use of which now averages about 40% of the total rubber consumed in the Dominion.

Canadian companies have been on their own in purchasing crude rubber since January 1. Most firms report they have not had much difficulty to date in obtaining natural rubber at the open market price. Current costs are said to be slightly above the government's selling price of 22.63c a pound.

Dunlop Tire & Rubber Goods Co., Ltd., has reported an operating profit of $1,307,719 for the year of 1946, which after depreciation, taxes, etc., amounted to a net profit of $442,940, equal to $7.08 a share on the common stock. This compares with a net profit of $246,772, or $3.62 a share, in the previous year. The 1946 net was based on the largest volume of sales in the company's history. Cash and government securities amounted to $883,000 at year-end, as compared with $1,440,000 at the end of 1945, the differential being reflected in expanded facilities and larger inventories of raw materials.

Membership of the United Rubber Workers' Union (CIO-CCL) in Canada has shown a 25 per cent increase during the past eight months in spite of the fact that the union staged the longest strike in its history during that period, Joseph Mackenzie, Canadian director, revealed recently in a report presented to some 60 delegates attending the first Canadian district council meeting of 1947.

Mr. Mackenzie told the delegates, representing 14 locals in Ontario and Quebec rubber plants, that the paid-up membership of the URWA is now in excess of 10,000, highest in the union's Canadian history. The union leader disclosed extensive organizing plans for 1947, with special emphasis on the Quebec rubber industry.

Delegates to the semi-annual District Six Council meeting passed a number of resolutions on national issues, and issued a blunt warning to the Dominion Government that the union will stage another drive for higher wages if the cost of living in 1947 continues to rise as it did during 1946, when the rubber workers won 16-cent hourly wage increases virtually throughout the Ontario rubber industry after a 17 week strike.

The Joseph Stokes Rubber Co., Ltd., Welland, Ontario, has announced that a contract has been placed for the construction of another addition to the Stokes plant. The new addition will contain over 23,000 square feet of floor space and be of modern steel, brick and concrete fireproof construction. The additional space is needed for the storage of raw materials and for manufacturing additional products for the automotive trade.

In collaboration with the Thermoid Company, it will undertake to manufacture Thermoid Fan Belts and Radiator Hose for the automotive trade in Canada and for export to the British Empire. The Stokes interests were acquired by Thermoid in the fall of 1943 with this purpose in mind. It is estimated that approximately $350,000 for buildings and machinery will be expended during 1947 for this purpose.

The $300,000 plant extension undertaken in 1945 was completed in 1946 and is now in operation, some of the new equipment running 24 hours a day. It is expected that the company will be in production on these new lines by November. More than 75 more employees will be required when this new addition is completed.

Indicative of the growing European demand for Polymer-produced synthetic rubber was a recent order, from a large Italian firm, for 500 tons of butyl rubber. A 400-ton shipment is already on its way to Italy and the remaining 100 tons will go shortly.

This Italian order is the largest European order ever received by the Polymer Corp. for butyl. Major shipments of Buna-S have been made at frequent intervals, but no previous butyl shipment has exceeded 500 tons. It is expected that it is the forerunner of several substantial orders from continental processors.

Also shipped from Polymer during January were 50 tons of butyl and 300 tons of Buna-S destined for Czechoslovakia.

Dutch East Indies rubber has begun arriving at Halifax after a wartime interruption of several years. A Dutch freighter recently brought 2,900 tons from Penang, destined for rubber factories in Ontario. It is the first of several shipments expected in the next two months, harbor authorities said.

The $1,000,000 Dow Styron plant at Sarnia, Ontario, was officially opened by Dow Chemical of Canada, Ltd., on February 20. The plant, which uses a completely new and unique process for the polymerization of styrene, is already turning out plastic molding powder at a rate of 500,000 pounds a month. It receives not only its raw material from Polymer Corp. facilities, but essential utilities, power, steam and water.

Seiberling Rubber Co. of Canada reports for 1946 net profits of $80,804, or $1.62 a share, compared with $41,183, or $1.31 a share, in the previous year. Balance sheet figures show current assets of $1,399,057 and current liabilities of $387,660, leaving net working capital of $1,011,397. This compares with net working capital of $904,784 one year ago.

The Board of Directors of the Goodyear Tire & Rubber Company of Canada, Limited, has appointed J. G. Williams as Comptroller and Assistant-Secretary of the company, it has been announced by R. C. Berkinshaw, Vice-President and General Manager.. P. B. Stevenson and C. W. J. Evans have been appointed Assistant-Comptrollers.

Two Divisions Retained by N.B.S.

The Divisions of Simplified Practice and Trade Standards will be retained at the National Bureau of Standards in the interests of effective service to business and industry, according to Secretary of Commerce W. Averell Harriman. Functions of the two divisions were transferred to the Secretary of Commerce under Reorganization Plan No. 3 of 1946, to be performed under his direction by officials of his designation. After studying these functions, Mr. Harriman ruled in favor of maintaining them at the National Bureau of Standards under the general supervision of Dr. E. U. Condon, Director of the Bureau. The two divisions are essentially fact-finding and coordinating agencies, although their activities are not necessarily based on scientific research.

Modicol G Tackifier

Modicol G, a new synthetic tackifier for neoprene and butyl rubbers, has been announced by the Nopco Chemical Co., formerly known as the National Oil Products Co., of Harrison, N. J. The new tackifier, an anhydrous resinous material, is said to be particularly useful in the formulation of friction compounds, as little as 2% of the weight of the rubber producing an excellent bond between fabric and rubber. Modicol G can be used either alone or in combination with other tackifying resins.

To Vote on Merger Proposal

A proposal to merge the U. S. Rubber Reclaiming Co., Inc., with its wholly-owned subsidiary, the Glanworth Realty Corp., will be voted on by stockholders at the annual meeting of the parent company on April 22. Under the plan, each share of $2 prior preference stock would be exchangeable for 1.46 shares of new $1.40 convertible preferred stock of the consolidated corporation.

NEW RUBBER GOODS

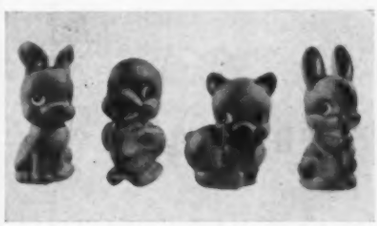
Waterproof Footwear for Miners

A new type of waterproof footwear for miners, which is said to be much lighter than conventional miners' footwear and yet in actual tests has been found to give greater satisfaction and frequently to stay waterproof longer

than laced rubber shoes, has been developed by the Mishawaka Rubber & Woolen Mfg. Co., Mishawa, Indiana. Made by the Ball-Band Liqua-Tex method, the uppers of the new footwear are sealed in a continuous layer of latex, assuring maximum waterproofing. Instead of conventional front lacing, a special one-eyelet lacing tab is provided on the back of the boot, providing an added safety feature in that it is out of the way and is not liable to catch on projecting rocks, timbers, etc.

Oak Squeeze-Me Toys

A new quartet of Squeeze Me rubber toys has been introduced by the Oak Rubber Co., Ravenna, Ohio. The quartet consists of Perky, the pup; Hoppy, the rabbit; Chubby, the pig; and Squawky, the duck. Of all-rub-



ber construction, the new toys are soft and pliable, and make ideal crib toys and playthings. Each toy is fitted with an all-rubber whistle, firmly cemented into the toy. The new toys are creamy yellow in color, with pink cheeks and blue eyes.

Flexible-Type Water Spigot

A new type of water faucet, featuring a movable spout, was recently developed and introduced by the General Tire & Rubber Co. of California, Pasadena, Calif. Known as the Commodore Ledge Type Swing Spout Faucet, it is made

from brass stampings and machined brass fittings, permanently silver-brazed. The model is equipped with an auto-spray attachment for rinsing dishes, which is easily operated with one hand by applying slight pressure on the spray lever. The spray head, made of molded plastic, will not become too warm to hold even when spraying with extremely hot water. Rubber tubing extends from the spray head to the faucet attachment. This new type faucet was the subject of one of the *Popular Science* movie shorts distributed by Paramount Pictures, Inc.

Protective Bottle Carrier

A bottle carrier, which will aid in the prevention of accidents and burns in laboratories and industrial plants is being manufactured by the U. S. Rubber Co. Lightweight and shockproof, it is designed to carry glass bottles containing such chemicals as acids, caustics, dyes, stains, inks and other liquids. The new safety device will help prevent the accidents and severe burns caused by dropping glass bottles containing harmful chemicals, as well as cuts from flying glass. The protective bottle carrier is available in two sizes, a gallon size and a five-pint or two-liter size. The outer bag is made of heavy duck, impregnated on both sides with chemical-resistant synthetic rubber. All seams are vulcanized. Carrying straps of double thickness run completely under the carrier so that the load is properly distributed and supported. A locking device on the drawstring keeps the carrier closed and prevents splashing. Other safety features include a firm disk base, a sponge rubber shockproof pad to protect the bottom against blows, and tubular sponge rubber side padding which completely surrounds the bottle. All are removable for cleaning.

Fairfoam Chair Cushions

A new line of slab foam rubber chair cushions, known as Fairfoam, has been introduced by the Fair Furniture Co., 1197 McCarter Highway, Newark 4, N. J. Produced in 1-inch, 1½-inch, and 2-inch sizes, the cushions are reported to be mothproof and verminproof. All cushions are covered with fibre matting on one side and gabardine on the other and are available in brown, green, and maroon. The company also manufactures a De Luxe Line of chair cushions, which are filled with 50% flaked foam rubber and 50% cotton felt.

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NEW EQUIPMENT

Fabric Festoon Storage Compensator

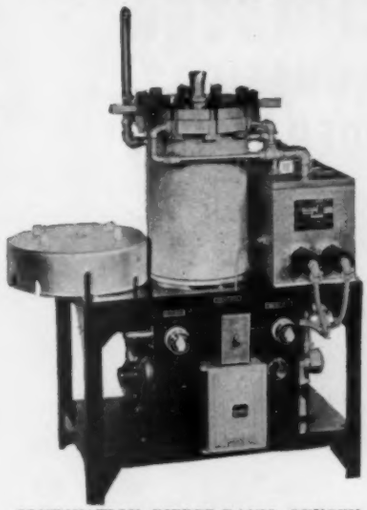
Adamson United Co., 730 Carroll St., Akron 4, Ohio, has introduced a Fabric Festoon Storage Compensator, which is used in connection with continuous fabric processing units such as rubber coating or plastic coating calenders to provide fabric storage between a fabric let-off stand and the processing unit. The device con-

sists of a vertical structure containing an elevator type carriage on which are mounted several rolls evenly spaced in accordance with similar rolls mounted on the top of the structure. The elevator type carriage is arranged to move up and down in a vertical direction.

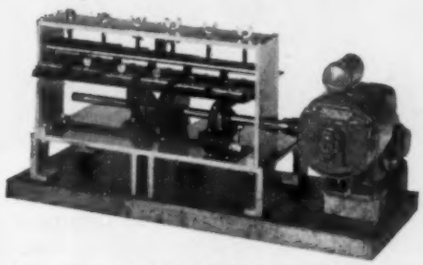
The machine usually stores approximately 60 yards of fabric with the carriage in the lower position. When a roll of fabric at the let-off stand becomes empty, it becomes necessary to splice the tail end of the roll onto the beginning end of the new roll of fabric. This operation is said to require approximately one-half minute. During this time, the calender or processing unit draws the fabric from the Fabric Festoon Storage Compensator, which raises the carriage to the top position in the machine. After the fabric splice is completed, the let-off stand then feeds fabric at increased speed to the compensator, refilling it so that it is prepared for the next splicing operation. The machine is furnished with both a motor-operated raising mechanism to facilitate threading and also with a safety device which prevents the carriage from falling in the event the fabric breaks.

Specifically designed for light hydrocarbon analysis, the **Turner-Burrell Adsorption Fractionator** has been introduced by the Burrell Technical Supply Co., 1936 Fifth Ave., Pittsburgh 19, Penna. The simply-operated, self-contained unit, which combines the theory of adsorption fractionation with developments in equipment design, separates, identifies, measures and collects the components of light hydrocarbon gas mixtures and records the analytical data.

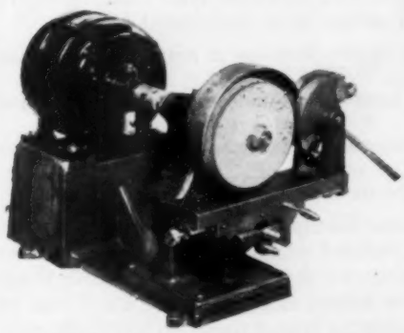
THE LABORATORY IS THE SOURCE OF EFFICIENCY



COMBINATION BIERER-DAVIS OXYGEN AGING AND AIR AGING APPARATUS



ROSS RUBBER FLEXING MACHINE



RUBBER SAMPLE BUFFING MACHINE (SHOWN WITH ROTARY PLATEN)

We manufacture various types of Rubber Laboratory Equipment including Bierer-Davis Oxygen Aging and Air Aging Apparatus, Aging Ovens and the Ross Flexing Machine.

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Taber Plastic Sheet Creaser

Designed to expedite efficiency of creasing or folding of cellulose acetate, ethyl cellulose, and other thermoplastic materials, a new sheet creaser has been introduced by the Taber Instrument Co., North Tonawanda, N. Y. Known as the Thermocreaser, the new unit

is reported capable of producing a 90° crease or fold on 5-to-20 pt. plastic up to 30 inches in width. Hand-fed and foot-operated, the unit makes creases or folds through extraction of heat from a heated, thermostatically-controlled blade and penetration of released heat into the sheet stock, softening and creasing it as the blade presses the material into a metal forming die or a resilient rubber pad. The time element of creasing varies, with lighter gauges being creased almost instantly and heavier thicknesses taking slightly longer. The Thermocreaser operates on 115-volt or 230-volt AC or DC circuit and ordinarily produces maximum results on most thermoplastic type sheets at a temperature of 240°F. Operating controls of the unit include current and thermoplastic control element lights, temperature regulation thermostat, blade temperature thermometer, and adjustable back gauges.

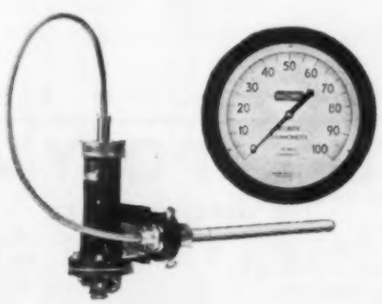
New Electromax Temperature Controller

A new type of inexpensive temperature controller for the control of ovens, presses, stills, baths and coolants, said to have high sensitivity and versatility, and to require practically no attention, was recently introduced by the Leeds & Northrup Co., 4911 Stenton Ave., Philadelphia 44, Penna. Part of the company's

Electromax line, the new instrument is especially designed for those applications where indicating and recording are not required. It signals and controls only, although temperature readings can be taken manually with it at any time. The new instrument consists of a Wheatstone bridge circuit with a vacuum tube amplifier as the detector. Completely a-c operated, it needs no dry batteries or standard cells. The lack of indicating or recording mechanism makes the new controller a practically "zero maintenance" instrument.

Moore Nullmatic Thermometer

The development of a new type of industrial thermometer which converts temperature to air pressure and transmits this pressure to a receiving indicator, recorder or controller, was recently announced by the Moore Products Co., H and Lycoming Streets, Philadelphia 24, Penna. Called the Moore Nullmatic Ther-



mometer, it operates on a pneumatic "null" balance principle in which the pressure in a gas-filled thermal element is balanced by air pressure. It is said to provide high-speed pneumatic transmission of the measured temperature over distances of 1,000 feet or more and eliminates the need for long lengths of capillary tubing. The operating range of the thermometer may be reset over wide limits by the use of a suppression adjustment in the transmitter, which is also used for setting zero.

Weathering qualities of
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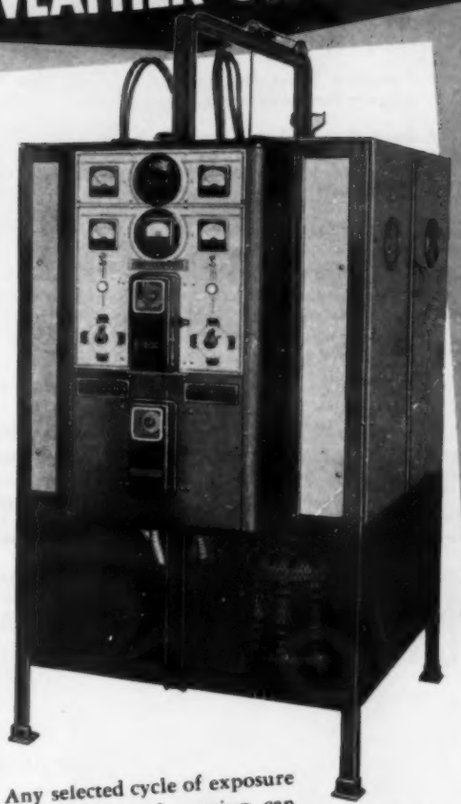
ATLAS *twin arc*
WEATHER-OMETER



Any selected cycle of exposure to sunlight and wetting can be set for automatic continuous testing in the Weather-Ometer. Exact tests can be duplicated at any time by settings on the control panel which contains temperature regulator—time meter—light and water cycle switch — automatic cut-off switch — voltage adjusting switch — direct reading thermal regulator — reactance coil (for economical current consumption). The Weather-Ometer is fully automatic in operation; can be left unattended over night; only necessary to renew carbons once in 24 hours. Years of exposure to any conditions of weathering reduced to a few days testing in the laboratory with the Weather-Ometer.

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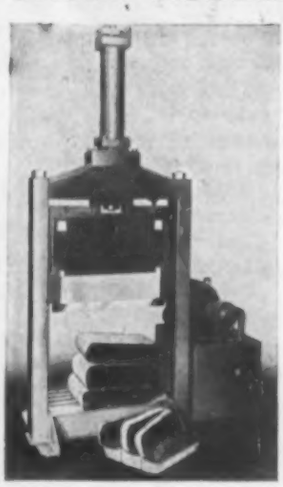

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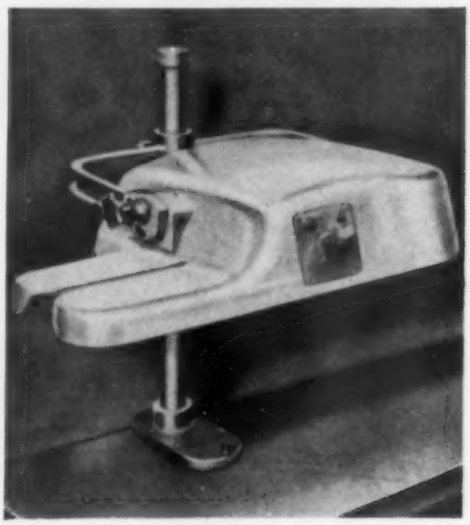
Sav-Way Sara-Seal Machine

A new type of continuous belt heat sealing machine for all kinds of plastic films, which combines the principle of the jaw and hot roll type sealing units, was recently introduced by Sav-Way Industries, 4875 East Eight Mile Road, Detroit 13, Mich. In operation, two



thin endless steel belts carry the film through the heat sealer. The film is loaded into one end of the machine and firmly held by stainless steel belts as it is carried into the heating zone, which consists of two opposed copper bars heated by resistance heaters accurately controlled by an electronic temperature controller. A rheostat connected in series with the two heater shoes allows the operator to balance the temperature of the two shoes. Heat is transferred rapidly through the thin metal belts and film, causing the sheets to flow together. From the heating zone the belts carry the softened film into a cooling zone that is air cooled. Pressure on the material is achieved by having one of the heating shoes solidly mounted, but equipped with adjusting nuts for proper alignment. Timing is controlled by regulation of the speed of the steel belts. The Sav-Way unit has been designed so that it is easily adapted to a number of applications.

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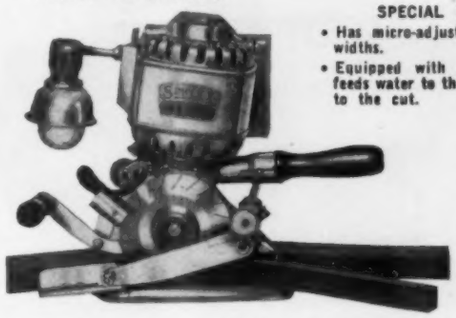

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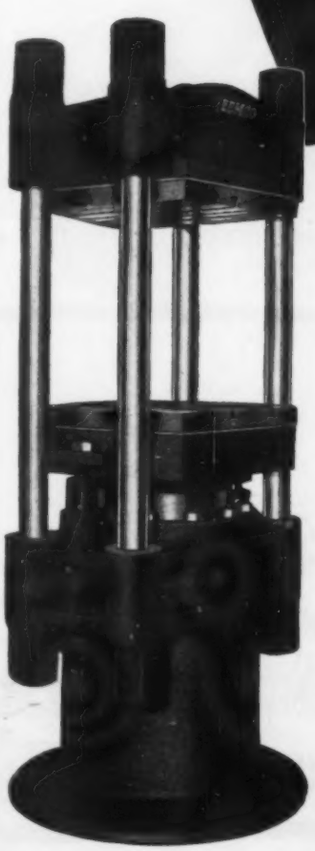

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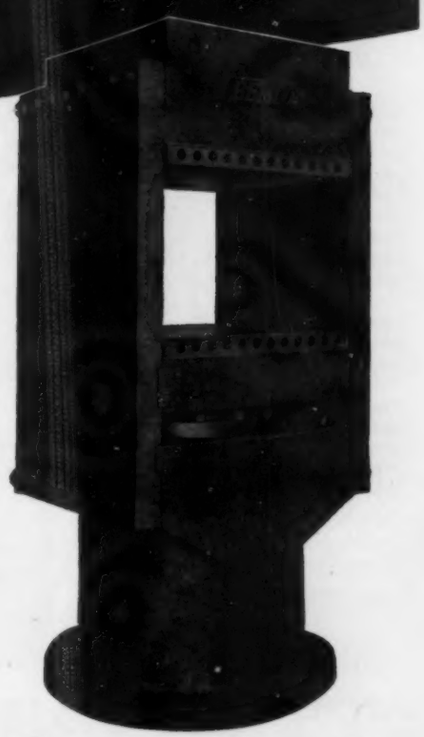

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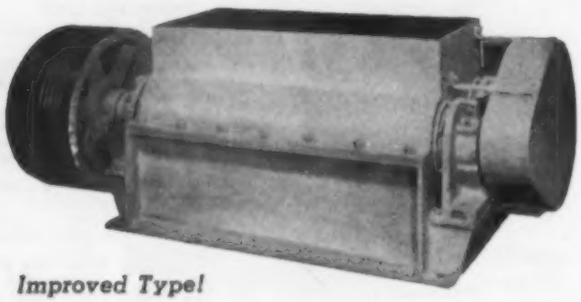

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Beardsley & Piper Speed Densifier

A new automatic mixer and densifier is being manufactured by the Beardsley & Piper Co., 2424 North Cicero Ave., Chicago 39, Ill., for use in the manufacture of plastics and synthetic fibers for fabrics.

Called the "Speed Densifier," the machine mixes and reduces the volume of the material in one operation, producing finished molding powder or cellulose solids ready for grinding, eliminating rolling or milling.

The new machine is said to mix and completely saturate various types of fillers with dry or liquid resins, and to permit fillers such as asbestos, mica, or Fiberglas, which do not absorb resins, to be coated uniformly. Certain rubber compounds may also be processed. In the synthetic fiber industry, this machine replaces two operations, rolling and curing, because it will combine resin with plasticizer.

Reported to be the first densifier to be equipped with accurate time and temperature controls, the manufacturer also claims that the Speed Densifier regulates exactly and will duplicate the heat and length of a cycle, eliminating any variation between batches. Designed for volume production, the machine produces perfect dispersion of from 1000 to 6000 pounds an hour depending on the material.

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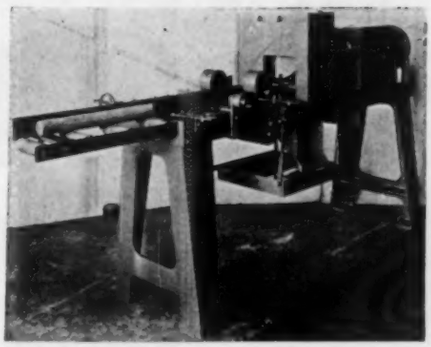

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REVIEWS

BOOKS

Symposium on Adhesives. American Society for Testing Materials. 1916 Race St., Philadelphia 3, Penna. 6 x 9 in. 72 pp. $1.00.

The papers appearing in this volume were presented at Atlantic City, N. J., on October 10, 1945, during meetings of A.S.T.M. Committees D-14 on Adhesives, D-9 on Electrical Insulating Materials, and D-20 on Plastics, and were sponsored by Committee D-14 as a Symposium on Adhesives. The symposium comprised seven papers, five of which were prepared by the various subcommittee officers from information supplied to them by the respective subcommittee members. The papers include: "Types and Uses of Adhesives," by T. R. Truax and R. F. Blomquist; 'A General Theory of Adhesion," by R. C. Rinker and G. M. Kline; "Strength Properties," (Subcommittee I) by R. C. Platow and A. G. H. Dietz; "Analytical Procedures Used on Adhesives," (Subcommittee II) by Leonard Repsher; "Permanence Tests of Adhesive Bonds," (Subcommittee III) by Fred Wehmer; "Adhesive Working Qualities," (Subcommittee IV) by C. B. Hemming; and "Preparation and Use of Specifications for Adhesives," (Subcommittee V) by Gerald Reinsmith.

•

Concise Chemical and Technical Dictionary. Edited by H. Bennett. Published by Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. 6 x 9 in. 1120 pp. $10.00.

This new dictionary contains definitions and data on some 50,000 products and materials, including trade names or proprietary products in the rubber, plastic, textile, synthetic resin, food, pharmaceutical, paint and varnish fields, covering emulsifying and wetting agents, plasticizers, detergents, accelerators, antioxidants, etc. In most cases considerable data in concise form for chemical compounds is given, including chemical name, synonymous names, semi-structural formula, molecular weight, color and form, specific gravity, melting and boiling points, and solubilities and uses. Proper pronunciation of chemical names is indicated. Other data furnished in the dictionary includes conversion tables for weights, measures, temperature, specific gravity; organic ring systems; chemical elements and their discoverers; indicators, their range and use, and vitamin values of important foodstuffs.

•

The Plastics Industry. By Barrett L. Crandall. Published by the Bellman Publishing Co., Inc., 83 Newbury St., Boston 8, Mass. 6 x 9 in. 44 pp. $1.00.

Written by the former director of public relations of the Society of the Plastics Industry, this monograph is one of a series of 75 occupational booklets used in connection with guidance activities and for individuals choosing a career. It contains interesting factual information on the development of plastics, make-up of the industry, forming and fabricating of plastics, and describes briefly various plastics materials now in use. An outstanding feature is an analytical index of occupations, especially prepared to assist in locating information of jobs in the industry from plant engineer to machine operator. A list of schools having courses in plastics is given by states.

•

Sun "Job-Proved" Products for Industry. Sun Oil Co., Philadelphia 3, Penna. 8½ x 11 in. 4 pp.

Intended as a quick and ready reference for industrial users of petroleum products, this folder lists and describes the uses and characteristics of the company's most important industrial products. These are divided into the following six groups: industrial oils, industrial greases, metal working oils, processing oils, miscellaneous industrial products, and motor products.

BOOKLETS, CATALOGS, etc.

Cultivo del Caucho en la America Tropical. (Cultivation of Rubber in Tropical America). Published by the Office of Agricultural Cooperation, Pan-American Union, Washington, D. C. 7 x 10 in. 48 pp. (In Spanish).

As indicated by the title, this booklet covers the cultivation of rubber in tropical America and is based in large part on the work accomplished through the cooperative efforts of various Latin American governments with the United States. Details of the procedure to be followed in the development of *Hevea brasiliensis,* particularly by small farm operators, are given. Considerable attention is paid to bud-grafting and other methods of securing high-yielding trees, with the results of experimental work in this direction given. Attention is also given to methods of fighting disease and blight. The booklet represents a Spanish translation of the series of articles by Dr. R. D. Rands, of the U. S. Department of Agriculture, which appeared in the *India Rubber World* in 1942.

•

Aminox in Natural Rubber Heavy Duty Inner Tubes. Naugatuck Chemical Division of U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N Y. 8½ x 11 in. 8 pp.

The second of a new series of compounding research reports, this current bulletin covers the incorporation of Aminox in a natural rubber heavy duty inner tube stock. Physical test data for two stocks, one a control stock and the other containing 1.5 parts Aminox, are given. The results indicate that inner tube stocks containing Aminox show a minimum change of tensile strength, modulus, and elongation when subjected to the combined effects of heat, air pressure, and tension.

•

Rubber. Published by the American Education Press, Inc., 1780 Broadway, New York 19, N. Y. 8¼ x 10¼ in. 32 pp.

Prepared from data and pictorial aids furnished by the Firestone Tire & Rubber Co. and written in answer to many requests from schools, this booklet gives an authentic, up-to-date account of rubber's history, production and use. It also tells the story of the spectacular rise of America's synthetic rubber industry during the war and gives an explanation of the chemistry and the making of synthetic rubber. Numerous applications of rubber, many of them developments of recent years, are depicted by photographs and drawings.

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The Dow Corning Silicone Release Agent

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REVIEWS (CONT'D)

Chicle and Allied Gums. By S. Earle Overley and Alice R. Griffith. Issued by the United States Department of Commerce, Washington, D. C. 8 x 10½ in. 22 pp.

Some interesting general information on chicle, the base gum produced from the latex of various trees of the *Zapotaceae* family, is contained in this report. The chemical characteristics of the gum together with a description of the chicle tree and the method of extraction are briefly covered. Tables are shown indicating United States imports of chicle from chief sources from 1940 through the first half of 1946, and total United States imports of chicle, jelutong, and allied gums from 1937 through the first six months of 1946. The status of chicle in Mexico, Guatemala, and British Honduras is also discussed. Selected articles appearing in publications of the Department of Commerce and in trade journals since 1940 pertinent to the procurement of chicle and its manufacture into chewing gum are listed.

•

A Simple Laboratory Falling-Film Molecular Still. (Publication No. 73). By E. Harold Farmer and D. A. Sutton. British Rubber Producers' Research Association, Ltd., 48 Tewin Road, Welwyn Garden City, Hertfordshire, England. 8½ x 11 in. 8 pp.

In this report, reprinted from the June, 1946, issue of the *Journal of the Society of Chemical Industry*, the authors describe a robust and easily operated falling-film molecular still in glass, with all the details regarding construction, accessories and lay-out being given. It is of the non-cyclic type, gives a vacuum of 10^{-5} to 10^{-6} mm. (as measured by an ionization gauge) in the distillation vessel, and is suitable for laboratory research work in which moderate quantities of material are to be dealt with. The still has a wide range of usefulness for the fractionation of mixtures of liquid of different *M.*, and in straight high-vacuum distillation.

•

Organic Chlorine Compounds. Carbide & Carbon Chemicals Corp., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 28 pp.

This is one of a series of bulletins, each of which describes chemicals in the important aliphatic groups. The current bulletin presents the latest data on twelve chlorinated compounds, industrially important as solvents, fumigants, and chemical intermediates. Information is given on the properties and uses, specifications, solubilities, comparative stability to reducing and oxidizing agents, and constant boiling mixtures. Charts showing the variation of certain properties with respect to temperature are also presented, and a comprehensive bibliography is included.

•

Corrosion-Resisting Process Equipment. (General Catalog H). Duriron Co., Inc., Dayton 1, Ohio. 8 x 10⅞ in. 20 pp.

This bulletin contains a general description of each type of corrosion-resisting equipment manufactured by the company, including pumps, valves, heat exchangers, immersion tubes, ejectors, mixing nozzles, exhaust fans, and tank outlets. Explanations are given of the composition and applications of Duriron, Durichlor, Durimet, and Chlorimet, the main corrosion resisting alloys of which the company's products are made. One section is devoted to a description of the production facilities of the company.

•

Dow Corning Silicones: New Engineering Materials. (Third Edition). Dow Corning Corp., Midland, Mich. 8½ x 11 in. 12 pp.

Practically all of the company's numerous silicone products now available, such as foam inhibitors, greases, pump fluids, varnishes, resins, and Silastic, are described in this revised catalog. In addition, the catalog contains many charts and graphs demonstrating the unusual properties of the rapidly increasing family of organo-silicon-oxide polymers.

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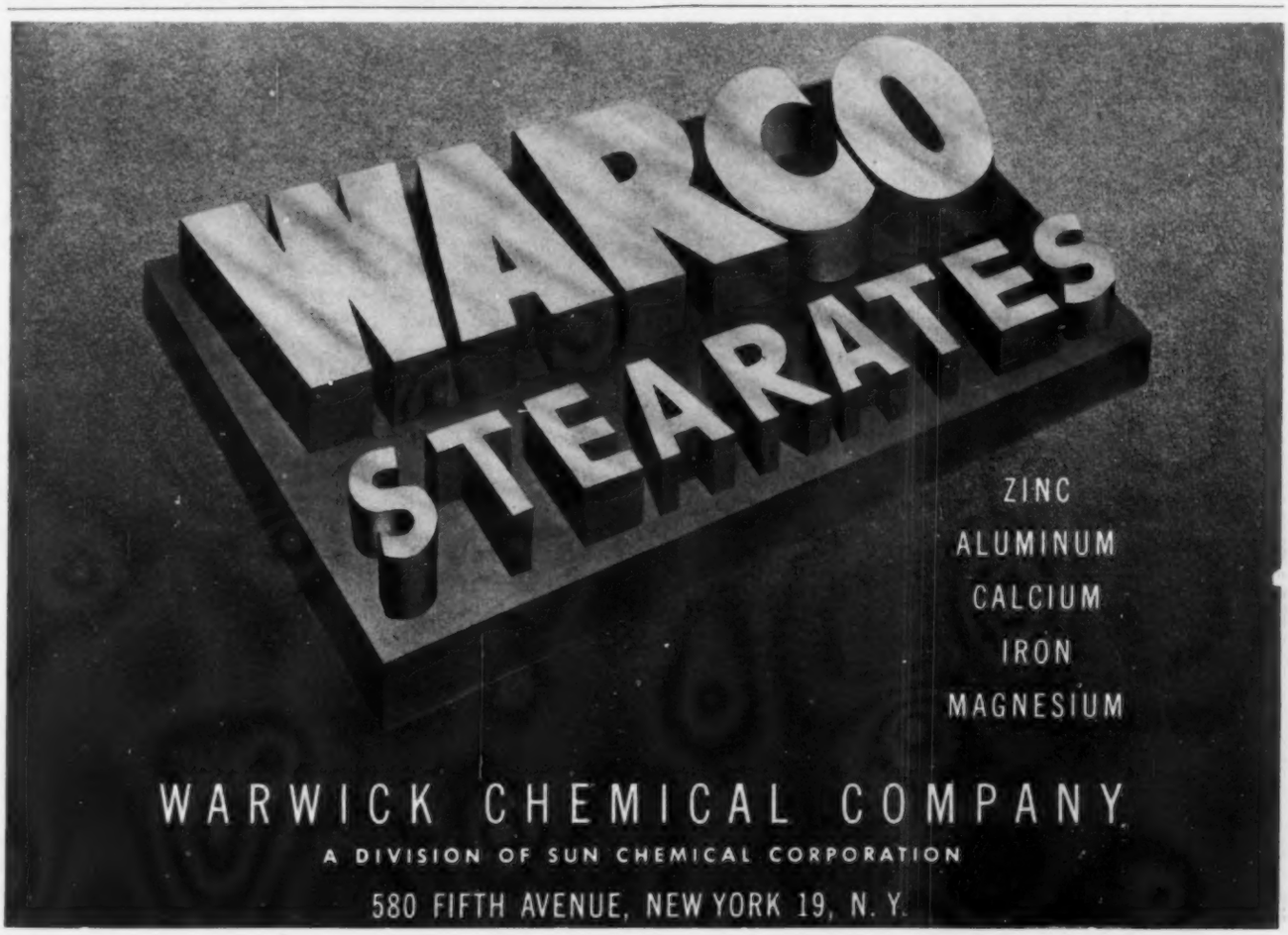

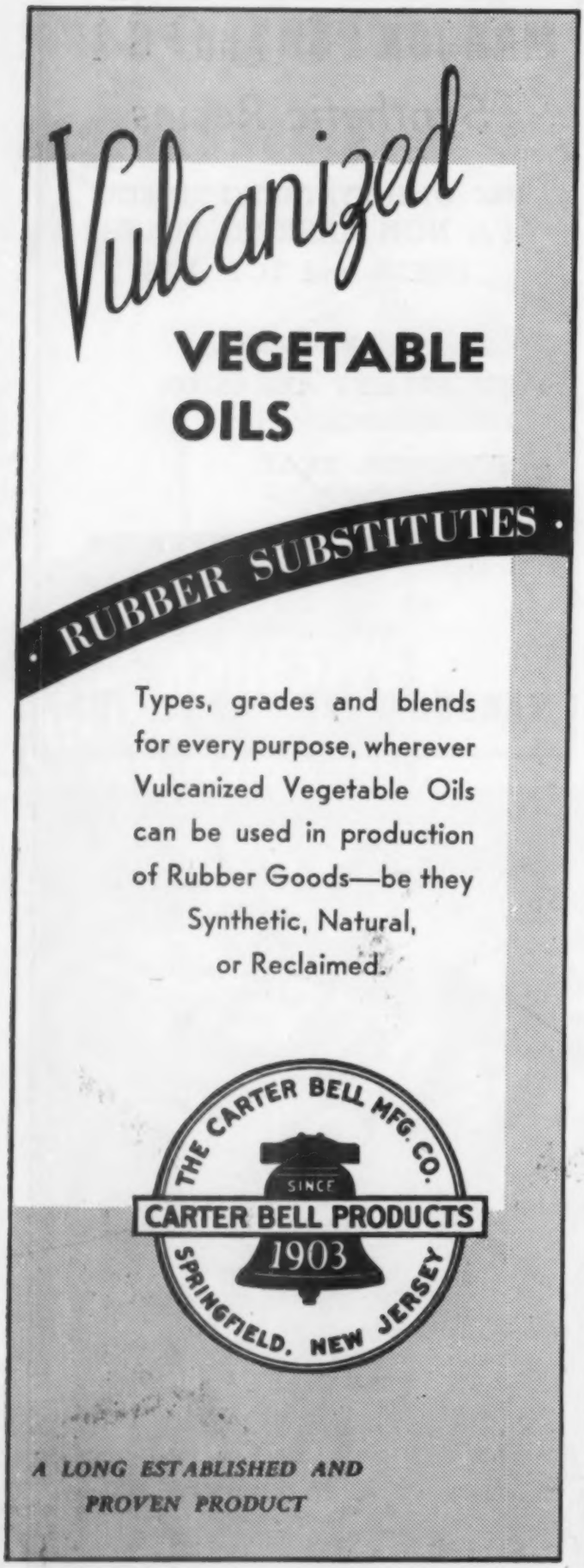

REVIEWS (CONT'D)

The Electronic Link between Measurement and Control. (Educational Bulletin No. 5). Wheelco Instruments Co., 847 West Harrison St., Chicago 7, Ill. 8½ x 11 in. 20 pp.

The fifth in a series of bulletins under the general title "Automatic Temperature Control Systems," this bulletin explains measurement and automatic control and the method of selecting the proper control system for processing applications. Hints governing the placement and use of thermocouples and the selection of thermocouple tubes are listed. Diagrammatic drawings are included, illustrating the electronic link, lags in heated batch processes, lags in liquid batch processes, and the effect of transfer lag in a two-position action control system. Definitions are given of A. S. M. E. terminology referring to processes and automatic control.

•

Parlon: Properties and Uses. Hercules Powder Co., Wilmington 99, Del. 8½ x 11 in. 36 pp.

The company's chlorinated rubber product which was used before the war as a base in paints for concrete and other surfaces exposed to action of chemicals, gases, moisture, mold growths and other destructive agents is covered in this booklet. Divided into two sections, one on properties and the other on uses, the booklet contains many new formulations as well as results of long-time exposure tests of Parlon finishes. Parlon finishes discussed are alkyd enamels, finishes for alkaline surfaces, paints resistant to chemicals, varnishes, traffic paints, furniture finishes, marine finishes, and emulsion paints. The applications of Parlon in adhesives, paper coatings, textile finishes, and inks are also described.

•

Emulsions. (Seventh Edition). Carbide & Carbon Chemicals Corp., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 76 pp.

Over one hundred practical formulas and methods for preparing industrial emulsions of oils, fats, waxes, solvents, and greases are presented in this booklet. Extensive additions and revisions have been made to the material given in previous editions, including descriptions of the uses of "Tergitol" wetting agents, "Carbowax" polyethylene glycol emollients, and "Cellosize" hydroxyethyl cellulose thickener in new emulsion formulas. The uses of many of the recently developed amine soaps and catonic dispersants which have become commercially popular as emulsifying agents are also described.

•

Kriston Thermosetting Resin. (Technical Bulletin PM5). B. F. Goodrich Chemical Co., Rose Building, Cleveland 15, Ohio. 8½ x 11 in. 12 pp.

This technical bulletin covers the properties and processing characteristics of the company's new thermosetting allyl ester casting resin. Profusely illustrated, it first discusses the properties of the monomer, and then describes the preparation of the monomer for catalysis and the curing of the catalyzed monomer. Several pointers to bear in mind when designing a mold for Kriston are discussed. The company recommends the use of this heat-resistant, thermosetting material for inexpensive cast lenses and prisms, for making novelties and decorative objects, and in the manufacture of electrical parts.

•

Pressure Reducing Valves. (Bulletin No. 461). Leslie Co., 184 Delafield Ave., Lyndhurst, N. J. 8½ x 11 in. 20 pp.

Illustrated in color, this booklet furnishes engineering, operating, and maintenance data on pressure reducing valves, differential valves, and overflow valves for steam, air, or gas service. Large cross-sectional and external views of each class of regulator are presented together with construction details and complete tables of pressure ranges, sizes, and capacities. A "ready-reference" index chart simplifies selection of the best valve for any specific industrial application. Recommended installations are shown and discussed for remotely adjusted valves, valves with internal ports, and valves designed for external control.

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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, APRIL 10, 1947

Natural Rubber

WITH the signing of legislation by President Truman on March 29 extending rubber controls for another year but ending government purchasing of natural rubber, trading circles in New York immediately girded for action. The Commodity Exchange, Inc., announced that rubber future trading will be resumed on May 1, with trading for September, 1947, delivery and each succeeding month up to and including July, 1948. The unit of trading will be 10 long tons, as before the war, and the single point of delivery will be New York City.

The New York trade, however, is already functioning, with the emphasis of demand on spot supplies and nearby arrival shipments. Spot prices were reported to average about 25½c a pound, while quotations on April, May and June arrivals were firm, ranging from 23¼c to 24¼c a pound. Premiums, however, are being offered for contracts specifying delivery in the three-month period, bringing the price up to about 25c.

Exports from British Malaya during February, 1947, amounted to 69,577 long tons, of which 18,236 tons went to the United States, 14,687 tons to the United Kingdom, and 36,654 to other countries. This compares with a total of 67,504 tons exported during January. Production of rubber in Dutch Borneo has declined sharply since last October, total production in January, 1947, being 4,457 tons, as compared with 10,622 tons in October, 1946. The decrease is due largely to political unrest.

Prices shown below are those established by Rubber Reserve on January 3, 1947, and apply to only approximately 45,000 tons of high-cost rubber. All remaining rubber by Rubber Reserve will thereafter be sold at a base price of 23c a pound.

Plantations—

Ribbed Smoked Sheets, No. 1X	.25¾
Thick Pale Latex Crepe, No. 1X	.25¾
Thin Pale Latex Crepe, No. 1X	.25¾
Thick Brown Crepe, No. 1X	.24⅝
Thin Brown Crepe, No. 1X	.24⅝
Thick Remilled Blankets, No. 1	.24⅝
Thin Brown Remilled Crepe, No. 1	.24½
Rolled Brown or Flat Bark	.21¼
Smoked Blankets, No. 1	.24⅜
Claro Brand 1XRSS	.25¼
Sole Crepe Trimminga	.25¼
R.C.M.A. Wtmkd. Crepe, No. 16	.29⅝
Sole Crepe	.25¾

Wild—

Uncut Fines, Crude	.18¼
Cut Fines, Crude	.18¾
Cut Fines, Washed & Dried	.25¾
Islands Fine, Crude	.17⅞
Weak Fine, Crude	.17⅜
Cameta, Crude	.13
Upriver Coarse, Crude	.15⅞
Manicoba, Crude	.15½
Caucho Ball, Crude	.14⅜
Panama Slab, Crude	.12⅜
Mangabiera, Crude	.11¾
Cameroons, Crude	.19½

Guayule—

Carload Lots	.20¾
Less-than-Carload Lots	.21¼

Latex—

Normal, Tank Car Lots	.29¼
Normal, Carload Drums	.31½
Normal, Less than 1 Drum	.38½
Centrifuged, Tank Car Lots	.31
Centrifuged, Carload Drums	.32½
Centrifuged, Less than 1 Drum	.39¾

Scrap Rubber

The scrap rubber market was still in the doldrums in the past few weeks, with a few large offerings being accepted by the reclaimers, many of whom seem to be in the position of liquidating inventory. The export market continues to be the one bright spot in the picture, and large dealers are continuing to exploit that market. At a meeting of the Scrap Rubber Institute in Chicago on March 19, James K. McElligott, executive vice-president of the Loewenthal Co., was elected president. The price situation is unstable at the moment. Current quotations follow:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$18.00
Beadless truck tires	ton	24.00
Mixed truck tires	ton	18.00
Beadless passenger tires	ton	24.00
No. 1 passenger peelings	ton	50.00
No. 1 truck peelings	ton	50.00
No. 2 passenger tubes	lb.	.07½
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06½
Mixed passenger tubes	lb.	.06¼
No. 2 truck tubes	lb.	.07¼
Red truck tubes	lb.	.07
Black truck tubes	lb.	.07
Buffings	ton	18.00
Air bags and water bags	ton	——
Boots and shoes	ton	——

Cotton Tire Fabrics

The brief slack in demand noted in the past month or two has disappeared and producers of tire fabric and chafers are again hard put to meet requirements. Export orders are again being declined, and there is no evidence of an early change in the situation. According to the *Rayon Organon,* tire fabric and cord output during 1946 reached the new high level of 522,000,000 pounds, 14% above the 1945 figure. Of the 1946 total, cotton tire fabric production amounted to 236,000,000 pounds, 11% above 1945, cotton tire cord to 74,000,000 pounds, 15% above 1945, and rayon and nylon tire fabric and cord to 212,000,000 pounds, 16½% above 1945. Of the total 1946 tire fabric and cord production, 59% was cotton and 41% was rayon. Some changes in the price structure of cotton tire fabrics and chafers have been made since our last report. Current quotations follow:

Standard, Peeler, 12/4/2	lb.	.7400
Standard, Peeler, 14/4/2	lb.	.7600
Standard, Peeler, 16/4/3	lb.	.7850
Extra Staple, Peeler, 12/4/2	lb.	.8370
Extra Staple, Peeler, 14/4/2	lb.	.8508
Extra Staple, Peeler, 16/4/3	lb.	.8646

Chafers

14.4 oz. (per sq. yard)	lb.	.7150
9.25 oz. (per sq. yard)	lb.	.7450
11.65 oz. (per sq. yard)	lb.	.6450
8.9 oz. (per sq. yard)	lb.	.6900

Sheetings

48x40	36 in.	5.50	yd.	—	@13.276
40x40	36 in.	6.15	yd.	—	@11.890
40x36	36 in.	6.50	yd.	—	@10.723
48x48	40 in.	2.50	yd.	—	@27.594
48x48	40 in.	2.85	yd.	—	@23.075
56x60	40 in.	3.60	yd.	—	@19.229
48x44	40 in.	3.75	yd.	—	@18.830

Cotton

The price of middling uplands on the Cotton Exchange has swung in the wide range of 171 points since our last report (March 6), high for the period being 36.75 on March 28 and low 35.04 on April 8. The average price for middling uplands for the month of March was 35.89, based on 25 trading days. After rising to a record 1947 high of 36.75 on March 28, prices turned downward during the latter part of the period. Tending to support the market were a generally favorable consumption estimate issued by the New York Cotton Exchange Service Bureau, the growing tightness of the domestic supply situation, and reported Indian inquiries for cheaper construction of American cotton textile goods. On the basis of the estimate for February, the service bureau placed domestic consumption of all cottons for the current season through that month at 6,049,000 bales, or about 17% greater than the 5,153,000 bales consumed during the first seven months of last season. Concern over the foreign political situation imparted the initial weakness to the market. Other depressing influences were President Truman's statement to business men that it was advisable to lower prices if they would curb another wage-price spiral, Under-Secretary of State Clayton's opposition to the continued payment of subsidies on exports of American cotton, and further buyer resistance. To a lesser degree, the weakness in outside markets and indications that the cotton crop might be larger than expected also influenced the decline in prices. Quotations for middling uplands on the Exchange follow:

	Mar. 6	April 10		
	Close	High	Low	Close
May	34.15	34.96	34.61	34.63
July	32.23	33.11	32.74	32.75
October	29.62	30.05	29.73	29.75

Reclaimed Rubber

No abatement in the demand for reclaimed rubber has been noticed in the past few weeks. Demand still stems from practically all branches of the rubber manufacturing industry, although a slight slackening in the demand from heel and sole manufacturers is evident. Consumption of reclaimed rubber jumped sharply in January, according to the Rubber Manufacturers Association, amounting to 26,061 long tons, an increase of 10.4% over December, 1946, and 18.3% over January, 1946. Current quotations on various grades of reclaim follow:

Tires

Black (acid process)	lb.	.08½	@	.08¾
Black, selected tires	lb.	.07½	@	.07¾
Truck, Heavy Gravity	lb.	.09½	@	.09¾

Shoe

Unwashed	lb.	.08	@	.08¼

Tube

Black Tube	lb.	.12¼	@	.12½
Red Tube	lb.	.13	@	.13¼

Miscellaneous

Miscellaneous blends	lb.	.05½	@	.06½
White	lb.	.14	@	.14¼

Ducks

Enameling (single filling)	lb.	—	@	69.750
Belting and Hose	lb.	—	@	67.166
Single filling, A grade	lb.	—	@	63.000
Double filling, A grade	lb.	—	@	66.500

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IMPORTERS

EXPORTERS

CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

APRIL 7, 1947

Prices are, in general, f.o.b. works.
Range of prices indicates grade or quantity variations.
All trade or brand names are set off in quotation marks.
Abbreviations: bbls., barrels; c.l., carlot; l.c.l., less than carlot; dlvd., delivered; t.c., tank cars; min., minimum; dms., drums; cyl., cylinder.
[a] East of Mississippi.

—The arrangement of this section follows closely the Chemical Section of the 1945 RUBBER RED BOOK to which readers are referred to determine the classification of any material or brand name.
—Although suppliers of every material were contacted for price information, only those materials are listed for which quotations have been furnished us. The quotations are not guaranteed and prospective purchasers should contact suppliers for confirmation before placing orders. Suppliers are requested to send us regularly current prices on all of their materials used in the rubber industry.
—All requests for information or listings should be sent to Market Editor, RUBBER AGE, 250 West 57th St., New York 19, N. Y.

ACCELERATORS

"A-1"	lb.	.34	.39
"A-10"	lb.	.40	.47
"A-19"	lb.	.52	.58
"A-32"	lb.	.59	.69
"A-77"	lb.	.42	.55
"A-100"	lb.	.42	.55
"Accelerator No. 8" (dlvd.)	lb.	——	.75
"Accelerator No. 49"	lb.	.40	.42
"Accelerator No. 89" (dlvd.)	lb.	——	1.20
"Accelerator No. 122" (dlvd.)	lb.	——	1.30
"Accelerator No. 552" (dlvd.)	lb.	——	1.63
"Accelerator No. 808" (dlvd.)	lb.	.59	.61
"Accelerator No. 833" (dlvd.)	lb.	1.13	1.15
"Acrin" (dlvd.)	lb.	——	.65
"Advan"	lb.	.52	.55
"Altax"	lb.	.39	.41
"Arazate"	lb.	——	1.53
"Beutene"	lb.	.59	.61
"B-J-F"	lb.	.34	.36
"Butasan"	lb.	——	1.10
"Butazate"	lb.	——	1.10
"Butyl Eight"	lb.	1.00	1.05
"Captax"	lb.	.34	.36
"C-P-B"	lb.	——	1.95
"Cumate"	lb.	——	1.60
"Cuprax"	lb.	.60	.62
"Dibenzo G-M-F"	lb.	——	1.50
Diorthotolylguanidine (dlvd.)	lb.	.44	.50
Diphenylguanidine (dlvd.)	lb.	.39	.40
"El-Sixty"	lb.	.39	.46
"Ethasan"	lb.	——	1.10
"Ethazate"	lb.	——	1.10
"Ethyl Thiurad"	lb.	——	1.25
"Ethyl Tuex"	lb.	——	1.25
Formaniline (dlvd.)	lb.	.36	.37
"G-M-F"	lb.	——	1.95
"Good-rite Erie"	lb.	.60	.62
"Guantal"	lb.	.43	.50
"Hepteen"	lb.	.42	.44
"Base"	lb.	1.80	1.85
"Ledate"	lb.	——	1.20
Mercaptobenzothiazole	lb.	.34	.36
Mercaptobenzothiazyl Disulfide	lb.	.39	.41
"Methasan"	lb.	——	1.20
"Methazate"	lb.	——	1.20
"Monex"	lb.	——	1.25
"Mono-Thiurad"	lb.	——	1.25
"Morfex 33"	lb.	.60	.62
"2-MT" (dlvd.)	lb.	.58	.60
"Novac"	lb.	——	1.40
"A-13"	lb.	.65	.67
"O-X-A-F"	lb.	.38	.40
"Pentex"	lb.	.74	.77
"Flour"	lb.	.12¼	.12¾
"Phenex" (tons)	lb.	——	.49
"Pipazate"	lb.	——	1.53
"Pip-Pip"	lb.	——	1.61
"R-2 Crystals"	lb.	——	1.55
"Rotax"	lb.	.44	.46
"Safex"	lb.	——	1.15
"Santocure"	lb.	.60	.67
"Selazate"	lb.	——	1.60
"Selenac" (Ethyl, Methyl)	lb.	——	1.60
"Setsit-5"	lb.	.75	1.00
"SPDX-G" (tons)	lb.	——	.59
"Tellurac"	lb.	——	1.60
"Tepidone" (dlvd.)	lb.	——	.63
"Tetrone" (dlvd.)	lb.	——	1.25
"A" (dlvd.)	lb.	——	1.85
Thiocarbanilide (dlvd.)	lb.	——	.34
"Thiofide"	lb.	.39	.46
"Thionex" (dlvd.)	lb.	——	1.25
"Thiotax"	lb.	.34	.41
"Thiuram E" (and "M") (dlvd.)	lb.	——	1.25
"Trimene"	lb.	.54	.56
"Base"	lb.	1.03	1.06
Triphenylguanidine (dlvd.)	lb.	——	.50
"Tuads" (Ethyl, Methyl)	lb.	——	1.25
"Tuex"	lb.	——	1.25
"Ulto" (tons)	lb.	——	.99
"L"	lb.	——	1.04
"Ureka"	lb.	.55	.62
"Blend B"	lb.	.55	.62
"C"	lb.	.52	.59
"Vistanex" (dms.)	lb.	——	.42
"Vulcanex" (dlvd.)	lb.	——	.45
"Z-B-X"	lb.	——	2.45
"Zenite" (dlvd.)	lb.	.37	.39
"A" (dlvd.)	lb.	.42	.44
"B" (dlvd.)	lb.	.39	.41
"Zimate" ("Butyl," "Ethyl")	lb.	——	1.10
"Zimate, Methyl"	lb.	——	1.20

ACTIVATORS

Blue Lead, Sublimed (dlvd.)	lb.	.08½	.09
Fish Oil, Hydrogenated, Fatty Acid			
"Hydrofol Acids 51" (dlvd.)	lb.	.36	.37
"Hyfac S-52" (c.l.)	lb.	——	.38
"Neo-Fat H.F.O." (dlvd.)	lb.	.14⅞	.16⅞
"Stearex Beads" (dlvd.)	lb.	.14⅞	.15⅜
Lime, Hydrated			
"Arrowhead"	ton	16.00	19.50
"Sierra"	ton	16.00	19.50
Litharge			
"Eagle" (dlvd.)	lb.	.09¾	.10¾
"FBS" (dlvd.)	lb.	.17	.17½
Magnesium Oxide, Heavy			
"General Magnesite"	lb.	.06	.08
"Michigan No. 15"	lb.	.05	.05½
"Permanente"	lb.	.05	.06½
Magnesium Oxide, Light			
"Baker's" (Neoprene Grade)	lb.	——	.28
"General Magnesite" (Neoprene Grade)	lb.	——	.28
"General Magnesite" No. 101	lb.	——	.175
"General Magnesite" Standard	lb.	——	.22
"K & M"	lb.	——	.28
"Michigan No. 30"	lb.	——	.22½
"No. 40"	lb.	.25	.28
"Witco Extra Light"	lb.	.25	.27
Oleic Acid (dlvd.)	lb.	.31½	.34½
"Elaine O-18"	lb.	.31½	.32¾ [a]
"L.C.P. Red Oil"	lb.	.31½	.33¾
Palm Oil Fatty Acid (c.l.)	lb.	——	.11
Potassium Oleate (drums)	lb.	——	.29½
Red Lead			
"Eagle" (dlvd.)	lb.	.10¾	.11¾
"No. 2 RM" (dlvd.)	lb.	.18½	.19
Sodium Laurate (drums)	lb.	——	.19
Sodium Oleate—Powder (drums)	lb.	——	.35
Paste (drums)	lb.	——	.20
Sodium Stearate—Powder (drums)	lb.	——	.35
USP Grade (drums)	lb.	——	.37
Stearic Acid, Single Pressed			
"S-24" (c.l., dlvd.)	lb.	——	.38 [a]
"Stearex B" (dlvd.)	lb.	.37	.38

ACTIVATORS (Cont'd)

Stearic Acid, Double Pressed			
"Alba" (dlvd.)	lb.	.41¼	.42½
"S-2-A" (dlvd.)	lb.	.38½	.39½
"S-2-B" (dlvd.)	lb.	.38	.39
Stearic Acid, Other			
"Hydrex" (c.l., dlvd.)	lb.	——	.14⅞
"Neo-Fat 1-60" (dlvd.)	lb.	——	.36½
"Neo-Fat 1-65" (dlvd.)	lb.	——	.38
"Stearite"	cwt.	36.00	38.00
White Lead Carbonate (dlvd.)	lb.	.16	.16¼
Zinc Laurate (c.l.)	lb.	——	.29
"Laurex"	lb.	.33	.34
Zinc Stearate	lb.	.29	.31
"Aquazinc"	lb.	.20	.35

Unclassified Activators

"Actifat" (dms.)	lb.	——	.18
"Acidex"	lb.	.19	.32
"Aero Ac 50"	lb.	.46	.52
"165"	lb.	.43	.45
"Barak" (dlvd.)	lb.	——	.60
"Bunac K-17"	lb.	.17	.19
"D-B-A"	lb.	——	1.95
"Delac J"	lb.	.55	.57
"P"	lb.	.45	.48
"Dibutylamine No. 117" (l.c.l., dms.)	lb.	——	.69
"Palmalene" (drums)	lb.	——	.15
"Polyac" (dlvd.)	lb.	——	1.40
"Ridacto" (drums)	lb.	.22	.24
"Snodotte" (dlvd.)	lb.	.37½	.38½
"SOAC" (min. 10 dms.)	cwt.	——	14.00
"Triamylamine No. 180" (l.c.l., drums)	lb.	——	1.01

ANTI-COAGULANTS

Anhydrous Ammonia (t.c.)	ton	——	59.00
"National" (cyl., dlvd.)	lb.	.16	.20
Aqua Ammonia (l.c.l., dms.)	lb.	——	.03
"M.B.M." (l.c.l.)	lb.	——	.35

ANTI-FOAMING AGENTS

"Aero Anti Foam H"	lb.	——	.12
"Regular"	lb.	——	.08½

ANTI-OXIDANTS

"Agerite Alba"	lb.	2.15	2.25
"Gel"	lb.	.55	.57
"Hipar"	lb.	.70	.72
"HP"	lb.	.58	.60
"Powder"	lb.	.43	.45
"Resin"	lb.	.52	.54
"Resin D"	lb.	.43	.45
"Stalite"	lb.	.43	.45
"White"	lb.	1.30	1.40
"Akroflex C" (dlvd.)	lb.	.58	.60
"Aminox"	lb.	.43	.45
"Antox" (dlvd.)	lb.	.54	.56
"Aranox"	lb.	——	2.15
Benzoquinone	lb.	1.50	1.75
"Betanox Special"	lb.	.61	.63
"B-L-E"	lb.	.43	.45
"Powder"	lb.	.61	.63
"B-X-A"	lb.	.43	.45
Carvacrol	lb.	——	.80
Chlorcarvacrol	lb.	——	2.00
"Flectol H"	lb.	.43	.50
"Flexamine"	lb.	.58	.60
Gallic Acid, Tech.	lb.	1.10	1.15
USP or NF	lb.	1.27	1.30
Hydroquinone	lb.	.90	.94
Monomethylparaminophenol sulfate	lb.	2.40	2.90
"Neozone Standard" (dlvd.)	lb.	.66	.68
"A" (dlvd.)	lb.	.43	.45
"C" (dlvd.)	lb.	.47	.49
"D" (dlvd.)	lb.	.43	.45
"D Distilled" (dlvd.)	lb.	.48	.50
"Oxynone"	lb.	1.15	1.22
"Parazone" (dlvd.)	lb.	——	.68
"PDA-8"	lb.	.40	.42
"10"	lb.	.46	.48
"11"	lb.	.86	.95
"14"	lb.	.60	.62
"Perflectol"	lb.	.58	.65
"Permalux" (dlvd.)	lb.	1.53	1.55
Pyrogallic Acid, Resublimed	lb.	2.60	2.65
USP Crystals	lb.	2.10	2.15
Resorcin, Tech. (dlvd.)	lb.	——	.64
"Santoflex B"	lb.	.43	.50
"BX"	lb.	.57	.64

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"Santovar-A"	lb.	1.30	1.37
"Santowhite"	lb.	1.40	1.52
"S.C.R." (tons)	lb.	——	.32
"Solux" (dlvd.)	lb.	1.48	1.50
"Stabilite" (tons)	lb.	——	.48
"Alba" (tons)	lb.	——	.69
"L" (tons)	lb.	——	.48
Tannic Acid, Tech.	lb.	.70	.79
"Thermoflex" (dlvd.)	lb.	1.48	1.50
"A" (dlvd.)	lb.	.70	.72
"C" (dlvd.)	lb.	.54	.56
Thymol	lb.	——	2.50
"V-G-B"	lb.	.43	.45

ANTI-SCORCHING AGENTS

"Retarder W" (dlvd.)	lb.	——	.36
Salicylic Acid, Tech.	lb.	——	.33
"Sodium Acetate 60-62% Crystals"	lb.	——	.05½
"Good-rite Vultrol"	lb.	.50	.55

ANTISEPTICS AND GERMICIDES

Formaldehyde (barrels)	lb.	——	.0695
"G-4"	lb.	.95	2.50
"G-11"	lb.	3.50	5.50
Methyl Para Hydroxy Benzoate	lb.	——	1.25
Ortho Cresol (26°-27°)	lb.	——	.18
"Soligen Drier"—Copper 8% (drums)	lb.	——	.21
"Zinc 8%" (dms.)	lb.	——	.19¾

AROMATICS (DEODORANTS)

"Arolene 1980" (c.l.)	lb.	——	.10
"2286"	lb.	——	.25
"2553" (c.l., dms.)	lb.	——	.13
"Bouquet 149"	lb.	——	3.00
Coumarin	lb.	2.75	2.90
"Curodex 19"	lb.	——	4.75
"188"	lb.	——	5.75
"198"	lb.	——	6.75
"D-6 Masking Perfume"	lb.	——	1.35
"Deodorant 65"	lb.	——	1.00
"Deodorant L-37" (25 lbs.)	lb.	——	2.15
"L-44" (25 lbs.)	lb.	——	2.65
"Latex Perfume 5"	lb.	——	3.25
"6"	lb.	——	7.50
"9"	lb.	——	.65
"Neutroleum Delta"	lb.	——	2.40
"Gamma"	lb.	——	3.40
"Parador A"	lb.	2.00	2.50
"B"	lb.	.65	1.00
"C"	lb.	2.75	3.25
"D"	lb.	1.50	2.00
"E"	lb.	.25	.55
"Rodo No. 0"	lb.	4.00	4.50
"No. 10"	lb.	5.00	5.50
"Rubbarome" (dms.)	lb.	1.10	2.10
"Rubber Perfume 7"	lb.	——	9.15
"12"	lb.	——	1.90
"Russian Leather 7"	lb.	——	4.10
Vanillin	lb.	2.35	2.40

BLOWING AGENTS

Ammonium Bicarbonate (dlvd.)	lb.	.06¾	.09¾
"Blowing Agent No. 15"	lb.	——	.35
Sodium Bicarbonate, Tech. (c.l., bags)	cwt.	——	1.85
"Sponge Paste"	lb.	——	.20
"Unicel" (dlvd.)	lb.	——	.60
"ND" (dlvd.)	lb.	——	1.00
Urea	ton	73.00	90.00

BONDING AGENTS

"Durez 12987"	lb.	.48	.53
"Interlake Resin No. 4162"	lb.	——	1.50
"MDI"	lb.	7.25	7.75
"50"	lb.	3.60	3.85
"Reanite"	gal.	6.75	7.25
"Rex Compound 482"	gal.	——	1.05
"Ty-Ply Q" (and "S")	gal.	6.75	9.00

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	——	6.75
Glacial—99½% (bbls.)	cwt.	——	11.30
Calcium Nitrate, Tech, Crystals	lb.	.12½	.15
Hydroxyacetic Acid—70% (dms.)	lb.	.059	.084
Zinc Nitrate, Tech.	lb.	——	.21½

COLORING AGENTS

Black

Carbon Black—See *Reinforcing Agents*			
"Lampblack No. 10"	lb.	.06	.09
"Mapico Black Iron Oxide" (50 lb. bags)	lb.	.0925	.095
"Raven Black Pure Iron Oxide"	cwt.	9.25	9.50

Blue

"Blue GD, Dispersed" (dlvd.)	lb.	——	3.95
"Paste" (dlvd.)	lb.	——	1.64
"Blue N" (dlvd.)	lb.	——	.945
"Blue YD, Dispersed" (dlvd.)	lb.	——	2.50
"Milori Blue 11840" (dlvd.)	lb.	——	.42
"Monastral Fast Blue CP" (dlvd.)	lb.	——	3.85
"PCD, Dispersed" (dlvd.)	lb.	——	2.50
"Ramapo Blue"	lb.	3.40	3.45
"Rubber Blue X-1999"	lb.	——	1.00
"Stan-Tone Blue"	lb.	1.40	4.40
Ultramarine	lb.	.12	.30
"Victoria Blue BP-262-D"	lb.	2.25	2.30

Brown

Brown Iron Oxide	lb.	——	.10
"Mapico Brown" (50 lb. bags)	lb.	——	.12

Green

Green Chromium Oxide, Pure	cwt.	29.50	36.50
Green Chromium Oxide, Pure, Hydrated	cwt.	70.00	85.00
"Green FD, Dispersed" (dlvd.)	lb.	——	1.50
"Monastral Fast Green GSD, Dispersed" (dlvd.)	lb.	——	3.20
"GSD Paste" (dlvd.)	lb.	——	1.10
"Permansa Green CP-594"	lb.	——	1.35
"Pigment Green B"	lb.	——	1.50
"GL-652D"	lb.	.88	.93
"Ramapo Green"	lb.	4.00	4.05
"Rubber Green X-1292"	lb.	——	1.00
"Stan-Tone Green"	lb.	1.60	3.60
"Utility Green"	lb.	——	.30

Orange

"Molybdate Orange"	lb.	.39	.45
"Orange F" (dlvd.)	lb.	——	3.35
"FD, Dispersed" (dlvd.)	lb.	——	2.50
"Rubber Orange X-2065"	lb.	——	2.60
"Stan-Tone Orange"	lb.	——	2.20

Purple

Purple Oxide	lb.	——	.08

Red

Barium Lithol Red	lb.	.60	.70
Cadmium Red	lb.	.95	1.25
Calcium Lithol Red	lb.	.60	.70
"Graphic Red" (dlvd.)	lb.	——	.70
Indian Red, Pure	cwt.	9.10	10.25
"Jozite"	lb.	.08¼	.08¾
"Mapico Red 297" (50 lb. bags)	lb.	.10	.10¼
"Oximony" Iron Oxide	lb.	——	.09
Red Iron Oxide, Light	cwt.	9.60	10.75
"Red PB" (dlvd.)	lb.	——	1.80
"PBD, Dispersed" (dlvd.)	lb.	——	1.65
"2B" (dlvd.)	lb.	——	1.65
"2BD, Dispersed" (dlvd.)	lb.	——	1.50
"Rubanox Red" CP-762 (dlvd.)	lb.	——	1.30
"Rubber Red CP-339" (dlvd.)	lb.	——	1.05
"Rubber Red X-1148"	lb.	——	.70
"Solfast Red CP-663" (dlvd.)	lb.	——	1.80
"CP-787" (dlvd.)	lb.	——	1.30
"Stan-Tone Red"	lb.	1.10	2.20
"Watchung Red"	lb.	1.80	1.85

White—Lithopone

"Albalith"	lb.	.05½	.05¾
"Astrolith"	lb.	.055	.0578
"Cryptone No. 19"	lb.	.07	.07¼
"CB No. 21"	lb.	.07	.07¼
"Permalith"	lb.	.04¼	.04½
"Ponolith"	lb.	.05½	.05⅞
"Sunolith"	lb.	.055	.0578

White—Titanium Pigments

"Rayox"	lb.	.15½	.18⅝
"Ti-Cal"	lb.	.06½	.06⅝
"Ti-Pure"	lb.	.16½	.19⅝
"Titanox A"—all grades (dlvd.)	lb.	.14½	.15¾
"B-30" (dlvd.)	lb.	.05¾	.06
"C" (dlvd.)	lb.	.05½	.05¾
"RA"—all grades (dlvd.)	lb.	.15½	.16¼
"RC-HT" (dlvd.)	lb.	.05½	.05¾
"Zopaque"	lb.	.16½	.17¼

White—Zinc Oxide (American Process)

"AZO-ZZZ 11" (and "22, 33, 44, 55")	lb.	.09½	.09¾
"Eagle"	lb.	.09	.09⅜
"Horse Head Special"	lb.	.09½	.09¾
"XX Red"	lb.	.09½	.09¾
"St. Joe Black Label"	lb.	.09½	.09¾
"Green Label"	lb.	.09½	.09¾
"Red Label"	lb.	.09½	.09¾

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	——	.12

White—Zinc Oxide (French Process)

"AZO-ZZZ 66"	lb.	.11¾	.12½
"Florence Green Seal"	lb.	.11¼	.11½
"Red Seal"	lb.	.10¾	.11
"White Seal"	lb.	.11¾	.12
"Kadox 72"	lb.	.09½	.09¾
"Black Label"	lb.	.09½	.09¾
"Red Label"	lb.	.09½	.09¾
"U. S. P. 12"	lb.	.12¾	.13

White—Zinc Sulfide

"Cryptone ZS-800"	lb.	.10	.10¾

Yellow

"Anchor Brand Pure Iron Oxide"	cwt.	7.75	8.00
Chrome Yellow	lb.	——	.26
bags)	lb.	.07¾	.08
"Chrome Yellow 12310"	lb.	——	.18
"Ferrox"	cwt.	7.50	8.50
"Mapico Yellow" (50 lb. bags)	lb.	.07¾	.08
"Rubber Yellow X-1940"	lb.	——	1.60
"Stan-Tone Yellow"	lb.	1.20	1.75

Yellow (Cont'd)

Toluidine Yellow	lb.	1.60	1.65
"YL-556-D"	lb.	.75	.80
bags)	lb.	.0685	.071
"Oximony" Iron Oxide	lb.	——	.06¾
"Yellow G" (dlvd.)	lb.	——	1.95
"GD, Dispersed" (dlvd.)	lb.	——	1.65
"HN" (dlvd.)	lb.	——	1.48
Zinc Yellow	lb.	.19	.24

DISPERSING AGENTS

"Agchem SA-19"	lb.	——	.30
"SA-20"	lb.	——	.70
"Aquasol-AR 90%"	lb.	——	.14½
"Beaconol 52"	lb.	.60	.75
"Darvan No. 1"	lb.	.19	.40
"No. 2"	lb.	.19	.40
"Dilex"	lb.	——	.32
"Dispersaid"	lb.	1.25	1.35
"Halloid"	lb.	.03¾	.09½
"HornKem No. 1"	gal.	——	1.60
"No. 3G"	gal.	——	1.75
"No. 12"	lb.	——	.17
"Marasperse CB"	lb.	.10½	.18
"N"	lb.	.09	.10
"Ramol PW"	lb.	.18	.19
"Rubbex"	lb.	——	.25½
"Stan-Chem BQC"	lb.	.12¼	.17¼
"1067"	lb.	——	.13½
"1471"	lb.	.1687	.2187
"2251"	lb.	.12¼	.17¼
Triethanolamine (drums dlvd.)	lb.	.19	.20
"Triton R-100"	lb.	.15½	.25
"Yelkin TT"	lb.	.36¾	.45¾
"Zinsper"	lb.	——	.15

EXTENDERS

"Advagum 1098"	lb.	——	.87
"Bunaweld Polymer No. 780"	lb.	——	.22
"No. 5514"	lb.	——	.30
"D-92" (and "D-93") (dms.)	lb.	——	.12
"Extender 600"	lb.	——	.208
"Multi-Plast MV 60 Emul."	gal.	.32	.37
"Naftolen MV 60 Emul."	gal.	.60	.65
"HV 60 Emul."	gal.	.75	.80
"PR-162 Latex" (dms.)	gal.	1.00	1.60
"Synprolac"	lb.	——	.19
"Synprowax"	lb.	.16	.19
"Vistanex Polybutene"	lb.	——	.32

FILLERS (Inert and Reinforcing)

Abrasives			
"Carbonite"	lb.	.13	.95
"Lionite"	lb.	.09¾	.90
Aluminum Hydrate	lb.	——	.17
Aluminum Silicate			
"Silical"	ton	37.00	55.00
"Marter White"	ton	20.50	30.00
Barium Carbonate (l.c.l.)	ton	77.00	85.00
Barytes			
No. 1 Floated, White	ton	30.10	41.55
No. 2 Floated, Unbleached	ton	28.10	38.95
"No. 22 Barytes" (c.l.)	ton	——	18.37
"Foam A"	ton	——	30.10
Bentonite (c.l.)	ton	——	11.00
Blanc Fixe	ton	72.50	120.00
Blanc Fixe	ton	60.00	120.00
Calcium Carbonate			
"Atomite" (c.l.)	ton	——	30.00
"B.I. White No. 1" (c.l.)	ton	——	7.50
"Blue-Star XX"	ton	——	45.00
"B.I. White No. 1" (c.l.)	ton	——	7.00
"Calcene T"	ton	40.00	50.00
"Camelwhite" (c.l.)	ton	27.50	30.00
"Kalite" (c.l.)	ton	33.00	62.00
"Kalvan" (c.l.)	ton	105.00	133.00
"Lesamite" (c.l.)	ton	——	27.50
"Lim-Cal" (c.l.)	ton	——	12.50
"Millical" (c.l.)	ton	——	22.00
"Sierracal"	ton	15.00	18.50
"Suspenso" (c. l.)	ton	——	18.00
"Swansdown" (c.l.)	ton	——	18.00
"Witcarb R" (c.l.)	ton	——	105.00
"Witcarb R12" (c.l.)	ton	40.00	60.00
Calcium Silicate			
"Silene EF"	ton	110.00	120.00
Calcium Sulfate, Anhydrous			
"Snow White Filler"	ton	——	17.00
Calcium Sulfate, Hydrous			
"Crysta-Cal" (c.l.)	ton	——	12.50
"Terra Alba No. 1"	ton	12.00	14.40
Chalk Whiting (l.c.l.)	lb.	.0150	.0175
"Recco Paris Whiting"	ton	——	25.00
Clay			
"Alsite" (c.l.)	ton	——	13.00
"Aluminum Flake"	ton	15.50	60.00
"A.S.P. No. 1" (c.l.)	ton	——	30.00
"No. 11" (c.l.)	ton	——	40.00
"Buca" (c.l.)	ton	——	44.00
"Catalpo" (c.l.)	ton	——	33.00
"Champion"	ton	——	13.00
"C.S.D." (c.l.)	ton	——	12.00
"Crown"	ton	——	13.00
"Dixie"	ton	13.00	27.70
"Hydratex R"	ton	28.00	40.00
"Kaolloid Clay" (c.l.)	ton	——	10.50
"Markham" (c.l.)	ton	——	13.00
"McNamee"	ton	12.50	27.20
"Oldham"	ton	——	13.00
"Paragon"	ton	12.50	27.20
"Stellar-R"	ton	——	50.00
"Suprex"	ton	13.00	27.70
"Upton"	ton	19.50	21.00
"Whitetex" (c.l.)	ton	——	50.00

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FILLERS (Cont'd)

"Witco No. 1" (c.l.)	ton	13.00	- 33.00
"No. 2" (c.l.)	ton	13.00	- 33.00
Diatomaceous Earth	ton	30.00	- 50.00
"Kaylorite" (c.l.)	ton	——	- 30.00
Dolomite (c.l.)	ton	11.00	- 12.00
Flock			
Cotton	lb.	.08½	- .20
"Filfloc F 40-9000"	lb.	——	- .16
"Filfloc F 6000"	lb.	——	- .22
Rayon, bleached or dyed	lb.	.85	- 1.50
Rayon, grey	lb.	——	- .18
"Solka-Floc" (l.c.l.)	lb.	.05	- .12
Wool, bleached or dyed	lb.	.70	- 1.00
Glue, Bone (dlvd.)	lb.	.16½	- .18½
Ground Glass (l.c.l.)	lb.	.04	- .06
Leather, Shredded	lb.	.05	- .17
Lignin	lb.	.03	- .06
"Indulin"	lb.	——	- .09
Limestone, Pulverized	ton	3.25	- 10.00
"Micro Velva"	ton	30.00	- 32.00
"Velvet Filler, Regular"	ton	16.00	- 18.00
Magnesium Carbonate	lb.	.07¼	- .08¼
"Clearcarb"	lb.	.10	- .10½
"K & M"	lb.	.07¼	- .08¼
Magnesium Silicate	ton	18.00	- 35.00
"Airex"	ton	22.50	- 23.50
"Asbestol"	ton	17.00	- 25.00
"Blue Star Talc"	ton	——	- 21.00
"L.S. Silver"	ton	24.50	- 26.50
"Sierra White"	ton	20.75	- 22.75
Mica	lb.	.03	- .07
"Concord"	lb.	.06¼	- .06¾
"Micro-Mica"	lb.	.06½	- .07
"Mineralite" (c.l.)	ton	30.00	- 40.00
"Silversheen"	lb.	.06¼	- .06¾
"Triple A Mica" (c.l.)	ton	——	- 25.00
"Wet Ground Mica No. 160"	lb.	.05¼	- .06¾
Mineral Black			
"Keystone 126"	ton	——	- 13.00
Pumice	lb.	.03	- .03
Pyrophyllite			
"Pyrax A" (c.l.)	ton	——	- 11.50
"WA" (c.l.)	ton	——	- 13.00
Silica	ton	16.00	- 27.00
"Blue Star"	ton	——	- 21.50
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Talc, Domestic	ton	9.00	- 20.00
Walnut Shell Flour	ton	35.00	- 65.00
Whiting, Commercial	ton	8.00	- 20.00
"Cameline" (c.l.)	ton	8.50	- 10.00
"C-C-O White"	ton	——	- 14.50
"Keystone" (c.l.)	ton	——	- 16.00
"Snowflake" (c.l.)	ton	——	- 18.00
"Veroc" (c.l.)	ton	——	- 8.50
"York White" (c.l.)	ton	——	- 9.00
Wood Flour	ton	20.00	- 62.18

FINISHING MATERIALS, SURFACE

"Beaco Finishes"	gal.	1.05	- 1.35
"Black Out"	gal.	4.50	- 8.00
Shellac, Orange Gum	lb.	.70	- .80
"VanWax"	gal.	1.25	- 1.30

FLAME RETARDANTS

Chlorinated Paraffin	lb.	.10	- .25
"Halowax"	lb.	.24	- .30
"Zinc Borate 3167"	lb.	.12	- .16¾
"Zyrox"	lb.	.35	- .45

LUBRICANTS, MOLD

"Aquadag"	lb.	3.15	- 3.45
"Aquarex L Paste" (dlvd.)	lb.	——	- .85
"MDL Paste" (dlvd.)	lb.	——	- .32
Borax, Granular (l.c.l.)	ton	70.00	- 80.00
"Colite Concentrate" (dms.)	gal.	——	- .90
"Concentrex"	lb.	——	- .20
"Dipex"	lb.	.14	- .18
"Dri-Lube"	lb.	——	- .18
"Erlen Mold Lubricant"	gal.	1.00	- 1.25
"Glycerized Lubricant"	gal.	——	- 1.50
"Glydag"	lb.	1.30	- 2.00
"G.T.M.C. Solution"	lb.	1.05	- 1.35
"Kokobace"	lb.	——	- .12
"Latex-Lube"	lb.	.22¾	- .24¾
"Liqui-Lube"	lb.	.17¼	- .18¼
"Lubrex"	lb.	.25	- .30
"Migralube"	lb.	——	- .30
"Moldex"	lb.	——	- .12½
"Moldeze No. 1"	gal.	——	- 36.00
"No. 2"	gal.	——	- 10.00
"No. 3"	gal.	——	- 25.00
"Mold-Slick"	lb.	.202	- .215
"Orvus WA Paste" (dms.)	lb.	——	- .25
"Prodag"	lb.	.25	- .38
"Redotex Flakes" (dlvd.)	lb.	.29¼	- .30½
"Powder" (dlvd.)	lb.	.30¼	- .30⅞
"Rubber-Flo"	gal.	——	- 1.15
"Rubber-Glo"	gal.	——	- .94
"Rusco Mold Paste"	lb.	.12	- .18
"Sericite" (l.c.l.)	ton	65.00	- 75.00
"Ulco Mold Soap"	lb.	.16	- .29
"Werkrite Flakes" (dlvd.)	lb.	.26¾	- .27½
"Powder" (dlvd.)	lb.	.28	- .28½

LUBRICANTS, RUBBER

Lithium Stearate	lb.	.75	- .77
Propylene Stearate (drums)	lb.	——	- .40
"Rubberol"	lb.	——	- .18½

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.55	- .56
Calcium Stearate	lb.	.51	- .53
"Orel"	gal.	1.85	- 2.00
Polyethylene Glycol	lb.	.25	- .26
"Rexanol A"	lb.	——	- .11
"Separex A"	lb.	——	- .15
Zinc Stearate	lb.	.54	- .55

MOLD CLEANERS

"Actusol"	gal.	1.65	- 1.85
"Metso 99"	cwt.	3.05	- 4.45
"Granular"	cwt.	2.50	- 3.55
"Rubber-Sol"	gal.	——	- 1.89
"Shelblast"	ton	80.00	-140.00
Sodium Silicate	cwt.	.80	- 1.40
"Sprex A.C."	lb.	——	- .15

PEPTIZING AGENTS

Carbothermic Magnesia	lb.	——	- .13½
"Peptizer P-12"	lb.	.84	- .90

PLASTICIZERS & SOFTENERS

"AA" (drums)	lb.	——	- .13¾
"Acto 500"	lb.	——	- .09
"Adipol BCA" (dms.)	lb.	.43½	- .44
"Amalgamator Z-4"	lb.	——	- .30
"American" Pine Tar	gal.	.30½	- .38½
"Bardex"	lb.	.05	- .05¼
"Bardol"	lb.	.02¾	- .03
"B" (l.c.l.)	lb.	.05	- .05¼
"Bayol D"	gal.	.29½	- .31½
"F"	gal.	.46	- .49
Beeswax, Refined & Bleached	lb.	.64	- .74
Yellow Refined	lb.	.63½	- .68
"Bondogen"	lb.	.55	- .85
"B.R.C. No. 20"	lb.	.0105	- .0115
"B.R.H. 2"	lb.	.0225	- .0235
"BRS 700"	lb.	.012	- .018
"B.R.T. 3"	lb.	.019	- .02
"4"	lb.	.02	- .021
"7"	lb.	.0215	- .0225
"B.R.V."	lb.	.03	- .0375
"Bunarex"	lb.	.05½	- .06½
"Bunatak M"	lb.	——	- .20
"O"	lb.	——	- .18
"R"	lb.	——	- .14
"U"	lb.	——	- .15
"No. 21"	lb.	——	- .08
"No. 90"	lb.	——	- .08
"No. 865"	lb.	——	- .17
"No. 1080"	lb.	——	- .09½
Burgundy Pitch	lb.	.1051	- .1115
"Butac"	lb.	.1275	- .1650
Butyl Benzyl Sebacate	lb.	.75	- .77½
Butyl Palmitate	lb.	——	- .26⅛
Butyl Roleate	lb.	.16	- .18
"BWH-1"	lb.	——	- .11
"Campol" (t.c.)	ton	——	- 42.00
Candelilla Wax, Prime	lb.	.78	- .85
"Carbonex"	lb.	.03	- .03½
"S" Flakes	lb.	.04½	- .05
"S" Plastic	lb.	.0435	- .046
"Carbowax 4000" (drums)	lb.	.29	- .30
"Cardolite 615"	lb.	.37	- .40
"816"	lb.	.25½	- .28½
"5858"	lb.	.42	- .46
Carnauba Wax, Crude	lb.	1.30	- 1.35
Refined	lb.	1.40	- 1.45
Substitute	lb.	.45	- 1.08
Yellow	lb.	1.75	- 1.80
"Cellufiex 142" (and "179") (drums)	lb.	——	- .31½
Ceresine Wax	lb.	.15	- .20
"Contogum"	lb.	.06¾	- .10¼
"Cumar Resins"	lb.	.05½	- .14½
"Darex Copolymer X11"	lb.	.40	- .50
"X54"	lb.	.42	- .60
"D.B.M."	lb.	——	- .30
Degras, Common	lb.	.10	- .14
Diamylphenol (l.c.l., drums)	lb.	——	- .21
Dibenzyl Ether (drums)	lb.	——	- .40
Dibenzyl Sebacate	lb.	.66	- .70½
"Monoplex S"	lb.	.98	- 1.00
Dibutyl Phthalate	lb.	.34½	- .36½
Dibutyl Sebacate—Tech.	lb.	.49	- .51½
C.P.	lb.	.51	- .53½
Dicapryl Phthalate	lb.	.24½	- .27
"Di-Carbitol Phthalate" (dms.)	lb.	.37½	- .38
Dicyclohexyl Phthalate	lb.	——	- .43
"Dielex"	lb.	.05½	- .06
Diethyl Phthalate (t.c.)	lb.	.30	- .32
Dihexyl Sebacate	lb.	.47	- .49½
"Monoplex S"	lb.	.98	- 1.00
Dimethyl Phthalate	lb.	.28	- .30
Dimethyl Sebacate	lb.	.65	- .67½
"Dinopol" (dms.)	lb.	.43½	- .44
Dioctyl Phthalate (dms.)	lb.	.39½	- .40
"Monoplex DOS"	lb.	.87½	- .88½
"Dipolymer Oil"	gal.	.33	- .38
"Dispersing Oil No. 10"	lb.	.04½	- .04¾
"Dutrex A" ("B," "5," "6")	lb.	.02½	- .03¾
"15"	gal.	.10	- .189
"20," "21," "25"	lb.	——	- .03
"Dyal 89"	lb.	——	- .45
"Econo-Plast" (drums)	lb.	.03¼	- .03¾
"ELA" (dlvd.)	lb.	——	- .80
"Estac"	lb.	——	- .14½
"Ethox" (dms.)	lb.	.35½	- .36
"Flexol DOP" (dlvd.)	lb.	.34½	- .36
"Flexol 3GH" (dms., dlvd.)	lb.	.55	- .56
"3GO" (dlvd.)	lb.	.51½	- .53½
"4GO" (dlvd.)	lb.	.38	- .40
"H-70"	lb.	.56¾	- .64½
"Hercolyn" (dlvd.)	lb.	.12	- .16
"Herron-H.T."	gal.	.17	- .23
"Herron-Plas"	lb.	——	- .03½
"Herron-Wax"	lb.	——	- .04½
"HT-300"	lb.	.45¾	- .53
"Indonex 633½" ("634½, 638½, 639½")	gal.	.14	- .16
"VG" (dlvd.)	lb.	——	- .07
"Indopol H-300" (bbls.)	gal.	1.28	- 1.32

PLASTICIZERS & SOFTENERS (Cont'd)

"JMH"	lb.	——	- .65
"Kapsol" (dms.)	lb.	.50½	- .51
"KP 23" (dms.)	lb.	.48½	- .49
"70" (dms.)	lb.	.39½	- .40
"120" (dms.)	lb.	.59½	- .60
"140" (dms.)	lb.	.49½	- .50
"150" (dms.)	lb.	.41½	- .42
"201" (dms.)	lb.	.40	- .42
"Kronisol" (drums)	lb.	.35½	- .36
"Kronitex" (drums)	lb.	.31½	- .32
Lanolin, Tech., Anhydrous	lb.	.20	- .26
Lead Oleate	lb.	.16½	- .42
"Lindol" (drums)	lb.	——	- .25½
2-Mercaptoethanol (drums)	lb.	——	- .75
"Methox" (dms.)	lb.	.35½	- .36
Methyl Oleate	lb.	——	- .20
Methyl Stearate	lb.	——	- .34
"Montan Substitute No. 506"	lb.	.425	- .435
Montan Wax, Crude	lb.	.50	- .55
"Monten Wax" (c.l.)	lb.	.52	- .55
"Monty Wax"	lb.	——	- .35
"Multi-Plast" (drums)	lb.	.04¼	- .04¾
"Naftolen HV" (and "R-100") (drums)	lb.	.11	- .12
"Natac"	lb.	.1275	- .1650
"LV" and "MV" (drums)	lb.	.05¼	- .05¾
"Nerium"	lb.	——	- .09
"Nevillac Resins" (drums)	lb.	.23	- .45
"Neville Resins" (drums)	lb.	.09	- .14½
"Nevindene Resins" (drums)	lb.	.11½	- .14½
"Nevinol" (drums)	lb.	——	- .16
"Nevoll"	lb.	.03	- .04
"Nevtex 10" (drums)	lb.	——	- .08½
"Nuba 1" (and "2") (drums)	lb.	——	- .03½
"3X" (drums)	lb.	——	- .05
"15 (and 30) Oil" (drums)	lb.	——	- .17¾
"781 Oil" (drums)	lb.	——	- .22
"No. 480 Oil Proof Resin"	lb.	.14	- .14½
"Opalwax"	lb.	——	- .45
Ortho-Nitrobiphenyl	lb.	.06	- .11
"Ozokerite Wax No. 64 White"	lb.	.31	- .32
"Yellow"	lb.	.25	- .26
"P-1" (and "4, 6, 8, 20")	lb.	.26½	- .33
"P-75"	lb.	.66	- .72
"Pale 4" (and "1000")	lb.	——	- .17¼
Palm Oil	lb.	——	- .11
"Paradene Resins" (drums)	lb.	.05½	- .06½
"Para Flux" (drums)	gal.	——	- .19
"2016" (l.c.l.)	gal.	——	- .20
"Para Lube" (l.c.l.)	lb.	——	- .048
"Paraplex G-25"	lb.	1.04½	- 1.05½
"G-40"	lb.	.48¾	- .49¾
"Parmo"	lb.	.06	- .13½
"Paroil 143"	lb.	——	- .09¾
"170, Powdered"	lb.	——	- .18
"Pentalene 90" (l.c.l., dms.)	lb.	——	- .17
"92" (l.c.l., drums)	lb.	——	- .25
"Pentaphen No. 114" (l.c.l., bags)	lb.	——	- .23
"Pepton 22"	lb.	.70	- .75
"PG-16" (drums)	lb.	——	- .34
"Philplast No. 1"	gal.	.18	- .35
"No. 2"	gal.	.13	- .35
"Picco 10" (and "25")	lb.	——	- .11
"75" (and "100")	lb.	——	- .10½
"S.O.S."	gal.	.29	- .34
"Piccocizer 30"	lb.	.05½	- .06
"D"	lb.	——	- .10
"Piccolastic A" (and "B, C, D, E")	lb.	.20	- .20½
"F"	lb.	.12½	- .13
"Piccolyte S Resins"	lb.	.19	- .22½
"Piccoumaron Resins"	lb.	.07	- .11
"Piccovar"	lb.	.11	- .11½
"Piccovol"	lb.	.02	- .02¾
"Pictar"	gal.	.18	- .23
"Plas-Blend 360"	lb.	.02½	- .03
"Plastac M"	lb.	——	- .09½
"Plasticizer 3"	lb.	.12	- .14
"Plasticizer No. 7-2"	lb.	——	- .60
"No. 11-2"	lb.	——	- .32
"Plasticizer No. 1889"	lb.	——	- .565
"No. 1919"	lb.	——	- .52
"No. 2069" (l.c.l.)	gal.	——	- .23
"No. 2070" (l.c.l.)	gal.	——	- .30
"Plasticizer ODN" (Tech.)	lb.	.30	- .357
Purified	lb.	.36	- .417
"Plasticizer SC"	lb.	——	- .75
"Plasticizer VA-1"	lb.	.33	- .35
"Plastoflex 50"	lb.	.36	- .37
"J-21"	lb.	——	- .41
"Plastogen"	lb.	.07¾	- .12
"Plastolein X-55" (dms.)	lb.	——	- .60
"X-148" (dms.)	lb.	——	- .70
"Plastone"	lb.	.27	- .30
"Polymel Liquid"	gal.	.12	- .17
"Polymel Resins"	lb.	.02½	- .05½
"PT 101" ("400, 600, 800") (c.l., drums)	gal.	——	- .31
"Refrigerator Oil 145-R"	gal.	——	- 1.25
"Reogen"	lb.	.11½	- .16
"465 Resin" (drums)	lb.	——	- .04½
"Resin 731"	lb.	——	- .13¾
"Resin C"	lb.	.015	- .021
"Resinex"	lb.	.02¾	- .03¼
"L-4"	lb.	.01¾	- .02½
"Ridbo 369" (drums)	lb.	.08	- .09
"369-F" (drums)	lb.	——	- .12
Rosin Oil	gal.	.54	- 1.20
"R.P.A. No. 2" (dlvd.)	lb.	——	- .65
"No. 3"	lb.	——	- .46
"No. 4" (dlvd.)	lb.	——	- .80
"No. 5" (dlvd.)	lb.	——	- .57
"R.S.O. Softening Oil"	lb.	.02½	- .03
"Rubtar"	gal.	——	- .40

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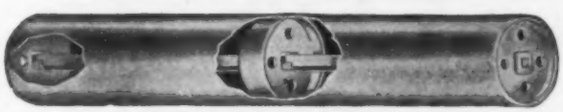

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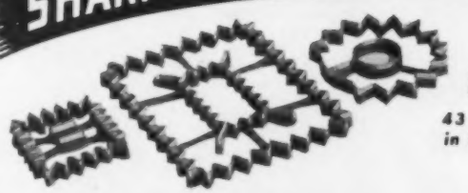

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PLASTICIZERS & SOFTENERS (Cont'd)

"Santicizer B-16"	lb.	.32	.36
"E-15"	lb.	.34	.38
"M-17"	lb.	.35½	.39
"No. 140"	lb.	.25	.35½
"Softener No. 20"	gal.	.09	.25
"S.P.C."	lb.	—	.19½
"Stanolind Petrolatum"	lb.	.032	.069
"Wax"	lb.	.25	.30
"Staybelite Resin" (dms.)	lb.	—	.11
"Sunny South" Pine Tar	gal.	.30½	.38½
"Superla Wax"	lb.	.23	.28
"Syncera Wax"	lb.	.16	.21
"Synplasticizer"	lb.	—	.10
"Syn Tac" (c.l.)	gal.	—	.33
"Synthol"	lb.	—	.22½
Tar, Refined	gal.	.10	.15
"K-Tarnel NR" (t.c.)	lb.	—	.0851
"Terpene A"	gal.	—	.65
"Thiokol TP-90 B" (and "TP-95")	lb.	.65	.75
"TP-99"	lb.	.60	.70
Triacetin	lb.	.34	.45
Tricresyl Prosphate	lb.	—	.33½
"Turgum S"	lb.	.11½	.13
"Vanadiset A" (to "F")	lb.	.0165	.05
"Pulverized"	lb.	.08½	.21
"Solution"	gal.	.40	.65
"Vistac No. 1"	gal.	—	1.32
"No. 2"	gal.	—	1.66
"No. 4"	gal.	—	1.80
"Wilcor-Plast"	lb.	.02½	.02⅝
"Witresin"—Granular	ton	41.00	43.00
Solid	ton	36.00	38.00

PROCESSING AIDS

Castor Oil, Processed (dms.)	lb.	—	.17¾
Refined (drums)	lb.	—	.15¾
"Castorwax" (min. 400 lbs.)	lb.	—	.25
"Dutrex 7"	lb.	.02½	.03¾
"30"	gal.	.24	.27
"Resin No. 510"	lb.	—	.16
"Wilmac D-X"	lb.	.09	.10
"Zeton" (dms.)	lb.	—	.32

PROTECTIVE & STABILIZING AGENTS

"Agchem SA-9" (to "SA-12")	lb.	.65	1.02
"Alpha Protein"	lb.	.28	.32
"Aroostoocrat"	lb.	—	.07½
Acacia	lb.	.12¾	.21
Carob Bean Flour	lb.	.42	.50
Casein	lb.	.33	.40
Ethylene Diamine 68%	lb.	.57	.58
Karaya Gum	lb.	.36	.45
"Prosein"	lb.	.071	.09
"Rex Compound No. 2801"	lb.	—	.15
Sodium Alginate	lb.	—	1.50
"Stablex B"	lb.	—	.95
Tragacanth Flakes	lb.	.60	1.35

RECLAIMING AGENTS

"1-D Heavy Oil" (drums)	lb.	.04	.05
"No. 517 H.B. Oil"	gal.	.11½	.16½
"535"	gal.	.22	.27
"No. 523 H.S. Oil"	gal.	.22	.27
"C-6 Oil" (and "28," "32")	gal.	.33	.38
"C-10 Oil"	gal.	.21	.25
"C-33 Oil"	gal.	.19	.24
Caustic Soda—Flake 76% (c.l., drums)	cwt.	—	2.90
Liquid 50% (t.c.)	cwt.	—	2.00
Solid 76% (c.l., drums)	cwt.	2.50	2.75
Cresylic Acid (99-100%)	gal.	—	.95
"D-4"	gal.	.19	.24
"E-5"	gal.	.17	.22
"LX-83 Reclaiming Solvent"	gal.	.13	.23
"LX-572 Reclaiming Oil"	gal.	.19	.28
"Q Oil"	gal.	.206	.256
"Reclaiming Oil 1621"	lb.	.02	.02¾
"Reclaiming Reagent No. 3"	lb.	.12	.15
"Reclaiming Resin No. 1"	gal.	.15	.35
"R.P.A. No. 3" (dlvd.)	lb.	—	.46
Soda Ash (c.l., bags)	cwt.	—	1.20
"Solvent 534"	gal.	.22	.27
"Solvent Oil 21"	gal.	—	.24
"Wilcor Reclaiming Oil No. 111" (drums)	gal.	.26	.30
"No. 151" (drums)	gal.	.26	.30
"X-1 Resinous Oil"	lb.	.0135	.02
"X-60 Solvent"	gal.	.20	.28

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

"Atlantic HPC-98"	lb.	.064	102
"Continental F"	lb.	.0632	.1025
"Croflex"	lb.	.0632	.1025
"Crow"	lb.	.0632	.1025
"Dixiedensed" (and "S")	lb.	.0632	.1025
"Huber HX"	lb.	.0632	.1050
"Kosmobile" (and "S")	lb.	.0632	.1025
"Kosmos T"	lb.	.0632	.1025
"Micronex HPC"	lb.	.0632	.1025
"Spheron 4"	lb.	.0632	.102
"Witco Disperso No. 6"	lb.	.0632	.1025

Channel, Medium Processing (MPC) (bags)

"Atlantic MPC-95"	lb.	.064	.102
"Colloidal Micronex" (dms.)	lb.	.07¼	.08¼
"Continental A"	lb.	.0632	.1050
"Croflex TH"	lb.	.0632	.1025
"Dixie R-1"	lb.	.0632	.1025
"Dixiedensed HM" (and "S-66")	lb.	.0632	.1025
"Huber TX"	lb.	.0632	.1050
"Kosmobile HM" (and "S-66, SMG")	lb.	.0632	.1025
"Kosmos M"	lb.	.0632	.1025
"Micronex Standard"	lb.	.0632	.1025
"Spheron 6"	lb.	.0632	.102
"Witco Disperso No. 1"	lb.	.064	.1025

Channel, Easy Processing (EPC) (bags)

"Atlantic EPC E-42"	lb.	.064	.102
"Collocarb"	lb.	—	.065
"Continental AA"	lb.	.0632	.1025
"Croflex 77"	lb.	.0632	.1025
"Dixiedensed 77"	lb.	.0632	.1025
"Kosmobile 77"	lb.	.0632	.1025
"Micronex W-6"	lb.	.0632	.1025
"Spheron 9"	lb.	.0632	.102
"Witco Disperser No. 12"	lb.	.0632	.1025
"Wyex"	lb.	.0632	.105

Channel, Conductive (CC) (bags)

"Dixie 5"	lb.	.0740	.1175
"Kosmink"	lb.	.0740	.1175
"Spheron C"	lb.	.08	.12½
"I"	lb.	.066	.111
"N"	lb.	.18½	.25
"Voltex"	lb.	.15	.18½

Furnace, High Elongation (HEF) (bags)

"Sterling K"	lb.	.05	.09

Furnace, High Modulus (HMF) (bags)

"Continex HMF"	lb.	.05	.09
"Dixie 40"	lb.	.05	.09
"Kosmos 40"	lb.	.05	.09
"Modulex"	lb.	.05	.09
"Philblack A"	lb.	.05	.06
"Statex 93"	lb.	.05	.09
"Sterling L"	lb.	.05	.09

Furnace, Semi-Reinforcing (SRF) (bags)

"Colloidal Black Dispersion 33" (drums)	lb.	.12¾	.13¾
"Continex SRF"	lb.	.03½	.07½
"Dixie 20"	lb.	.03½	.07½
"Essex"	lb.	.03½	.07½
"Furnex"	lb.	.03½	.07½
"Gastex"	lb.	.03½	.07½
"Kosmos 20"	lb.	.03½	.07½
"Pelletex"	lb.	.03½	.07½
"Seminex"	lb.	.03½	.05½
"Sterling R"	lb.	.03½	.07½
"Sterling S"	lb.	.03½	.07½

Furnace, Fine (FF) (bags)

"Statex B"	lb.	.05¾	.09¾

Thermal, Fine (FT) (bags)

"P-33" (c.l.)	lb.	.05	.07¾

Thermal, Medium (MT) (bags)

"Thermax" (c.l.)	lb.	.03	.06

REINFORCING AGENTS—MISCELLANEOUS

"Darex Copolymer No. 3"	lb.	.39½	.42
"No. 34"	lb.	.45	.47½
"Darex Copolymer Latex No. 3 (and "X34")	lb.	.44½	.50
"Durex 12687" (and "12707")	lb.	.27½	.29
"Marbon B"	lb.	.65	.75
"S" and "S-1"	lb.	.52	.65
"Marmix"	gal.	1.35	1.75
"Naftex EPC"	lb.	.08¼	.11¼
"HMF"	lb.	.06⅝	.09
"MPC"	lb.	.08¼	.11¼
"SRF"	lb.	.05⅝	.07⅞
"Wilcorite R Resins"	lb.	.27	.29

RETARDERS

"E-S-E-N"	lb.	.34	.36
"Retardac 15A"	lb.	.15	.16½
"Retardex"	lb.	—	.55

RUBBER SUBSTITUTES

Mineral Rubber

"38"	ton	26.00	32.50
"Black Diamond"	ton	26.00	27.50
"Byerlyte"	ton	36.00	50.00
Gilsonite, Selects (c.l.)	ton	33.50	34.50
"Hard Hydrocarbon" (dms.)	ton	32.00	34.00
"Herron Flake"	ton	40.00	42.00
Mineral Rubber, Granulated	ton	30.00	35.00
Solid	ton	27.00	32.00
"Parmr" (drums)	ton	26.00	30.00
"Pioneer"	ton	33.00	60.00

Vulcanized Vegetable Oils (Factice)

"Amberex"	lb.	.27	.38
Brown	lb.	.18	.38
Dispersed	lb.	.28	.49
"Neophax"	lb.	.20	.38
White	lb.	.13	.39

Miscellaneous Rubber Substitutes

"Gilsowax"	lb.	.04½	.05
"Insulac"	lb.	.06	.06½
"Resin No. 1098" (drums)	lb.	—	.42
"No. 1198"	lb.	.31	.35
"Wilmex M-4" (and "M-6")	lb.	.05½	.06

SOLVENTS

Acetone (dlvd.)	lb.	.07	.09
"American" Dipentene (t.c.)	gal.	.60	.67
"Amsco" Lactol Spirits (t.c.)	gal.	—	.13
"Rubber Solvent" (t.c.)	gal.	—	.12½
"Solv A" (t.c.)	gal.	—	.18
"Solv B" (t.c.)	gal.	—	.19½
"Special Napthalite" (t.c.)	gal.	—	.12½
"Textile Spirits" (t.c.)	gal.	—	.13
Amyl Chlorides, Mixed (l.c.l.) (drums)	lb.	—	.08
Benzol 90%	gal.	.17	.24
Butyl Acetate (t.c.)	lb.	—	.198
Butyl Alcohol (t.c.)	lb.	—	.206
Secondary (dlvd.)	lb.	.09½	.11½
Tertiary (dlvd.)	lb.	.11	.13
Carbon Bisulfide, Tech.	lb.	.05	.08
Carbon Tetrachloride	gal.	—	.80
Cyclohexane	lb.	.09½	.13
Cyclohexanone	lb.	.29	.34
Diacetone, Pure (dlvd.)	lb.	.11½	.13½
Dichlorethyl Ether (drums)	lb.	.16	.17
Formal (drums)	lb.	.26	.27
Dichloropentane (l.c.l., (drums)	lb.	—	.04½
"Dipentene 122" (dms.)	gal.	.68	.70
Ethyl Alcohol (t.c.)	gal.	.53½	.55½
Ethylene Dichloride (drums, dlvd.)	lb.	.08	.09
"Halowax Oil"	lb.	.27	.30
Heptanes (t.c.)	gal.	—	.15
Hexanes (t.c.)	gal.	—	.15⅜
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.40½	.53
Ether, Ref. (dlvd.)	lb.	.04½	.06½
Mesityl Oxide (dlvd.)	lb.	.11½	.13½
Methanol (dms., dlvd.)	gal.	.37	.44
Methyl Acetone, Syn. drums, dlvd.)	gal.	.46	.52
Methyl n-Amyl Ketone (drums)	lb.	.29	.30
Methyl Ethyl Ketone (dlvd.)	lb.	.09	.11
Methyl Isobutyl Ketone (dlvd.)	lb.	.12½	.14½
"N-5" Pentane Mix. (t.c.)	gal.	—	.06½
"N-6" Hexanes (t.c.)	gal.	—	.11¼
"N-7" Heptanes (t.c.)	gal.	—	.10½
"Petrolene" (t.c.)	gal.	—	.10⅛
Picolines, Alpha, Refined	lb.	.245	.25
Mixed	lb.	.24	.25
Pyridine, Refined	lb.	.55	.55½
Quinoline	lb.	.32	.32½
"Rubsol" (t.c.)	gal.	—	.08625
"Skellysolve B" (Hexanes) (t.c.)	gal.	—	.10½
"C" (Heptanes) (t.c.)	gal.	—	.10
"E" (Octanes) (t.c.)	gal.	—	.129
"R" (Solvent Naphtha) (t.c.)	gal.	—	.081
"Solvenol"	gal.	.54	.63
Solvent, Crude, Light	gal.	.19	.28
"Sunny South" Dipentene	gal.	.60	.67
Toluene (drums)	gal.	—	.28
Trichlorethane	lb.	.11	.12
Triglycol Dichloride (drums)	lb.	—	.49
"Tromex"	lb.	.078	.083
"X-7" Sp. Heptanes (t.c.)	gal.	—	.10
"X-8-A Solvent Naphtha"	gal.	—	.07¾
Xylene (drums)	gal.	—	.28

STABILIZING AGENTS (for Vinyl Resins)

Lead Stearate, Precip.	lb.	.55	.57
Fused	lb.	.60	.62
"Stabilizer JCX"	lb.	—	.45
"SN"	lb.	.36	.42
"V-1-N"	lb.	.44	.50
"V-9"	lb.	—	.85
"Vanstay"	lb.	.38	.40

SUN CHECKING AGENTS

"Antisol"	lb.	.23	.24
"Heliozone" (dlvd.)	lb.	.23	.24
"Sunproof"	lb.	.23	.24
"Jr."	lb.	.17	.18
"Tonox"	lb.	.50	.52

TACKIFIERS

"Advaresin 100"	lb.	.14½	.15
"Amberol ST-137X"	lb.	.33	.33½
"Agchem RC 30"	gal.	.65	1.34
"Beckopol 1400"	lb.	.27	.28
"Dutrex 44"	gal.	—	.919
"E-310 Resin Emulsion"	lb.	—	.14
"Galex"	lb.	.13¼	.25
"Koresin"	lb.	.40	.52
"Lindol Emulsion" (drums)	lb.	—	.27
"Liquid Rubber Flux"	lb.	—	.125
"Nevilloid C-55" (drums)	lb.	—	.12
"Pentacizer 344"	lb.	—	.20
"Pentalyn Resins" (dlvd.)	lb.	.14¼	.21
"Resin V"	lb.	—	.25¾
"Rubtack"	lb.	—	.12
"Staybelite Esters" (dlvd.)	lb.	.15	.23¾
"Super-Beckacite No. 1001"	lb.	.37	.38
"Wilcorite R-30"	lb.	—	.40

THICKENERS (FOR LATEX)

"Acrysol GS"	lb.	.14½	.22
"Betanol" (drums)	lb.	—	.70
"Emulsorex No. 5"	lb.	—	.35
Propylene Laurate (drums)	lb.	—	.36
Sodium Silicate	lb.	.01	.02

VULCANIZING AGENTS

Selenium

"Vandex"	lb.	—	1.75

Sulfur

"Crystex" (l.c.l.)	lb.	.32	.35
"Dispersed Sulfur"	lb.	—	.09
"No. 2"	lb.	.08	.12
"Devil" (c.l.)	cwt.	—	1.35
"Insoluble Sulfur 60"	lb.	—	.16
"Star" (c.l.)	cwt.	—	1.85
"Tire"	cwt.	1.35	2.15
"Tube" (c.l., dlvd.)	cwt.	—	2.60

Tellurium

"Latex Telloy"	lb.	—	1.75
"Telloy"	lb.	—	1.75

Miscellaneous Vulcanizing Agents

"VA-3"	lb.	.55	.65
"Vultac No. 1"	lb.	.38	.45
"No. 2"	lb.	.38	.45
"No. 3"	lb.	.42	.49

WASHING & FINISHING AGENTS

"Apcolene" (t.c.)	gal.	—	.09⅝

WETTING AGENTS

"Advawet No. 15"	lb.	—	.18¼
"No. 33"	lb.	.40	.43
"Aerosol OT 70% Clear"	lb.	.80	1.00
"Agchem SA-15" ("16, 18")	lb.	.17	.29
"Alrosol" (dms.)	gal.	—	.48
"Aquarex BBX Conc." (dlvd.)	lb.	—	.78
"D" (dlvd.)	lb.	—	.75
"ME" (dlvd.)	lb.	—	.90
"NS" (dlvd.)	lb.	—	.90
"NS" (dlvd.)	lb.	—	.75
"Areskap 50"	lb.	.30	.38
"Dry 100"	lb.	.60	.72
"Aresket 240"	lb.	.30	.38
"Dry 300"	lb.	.60	.72
"Aresklene 375"	lb.	.42	.57
"Dry 400"	lb.	.70	.84
Lecithin	lb.	—	.26
"Santomerse D"	lb.	.43	.65
"S"	lb.	.13	.25
"Sorbit P"	lb.	—	.28
"Stablex G"	lb.	—	.70
"Triton K-60"	lb.	33½	.41
"N-100"	lb.	.59½	.67
"R-100"	lb.	.14½	.25
"720"	lb.	.30½	.38
"770"	lb.	.21¾	.29¼
"Vultamol"	lb.	—	.17½

MISCELLANEOUS CHEMICALS

"Acto 450" ("550-W," "600," "630")	lb.	.109	.145
"Agchem SA-17"	lb.	—	.29
"Aquarex SMO" (dlvd.)	lb.	—	.50
"A.S.T.M. Oil No. 1" (and "No. 3")	gal.	1.00	1.15
"Black Shield 4701"	lb.	—	.21
"Copper Inhibitor X-872-L"	lb.	—	1.50
2-Ethylhexanol (dms., dlvd.)	lb.	.25	.26
Glycerine, 88% Sap., Crude (dlvd.)	lb.	.49½	.50
"Hydrozo"	lb.	—	.51
"MODX" (tons)	lb.	—	.29½
"Para Resin No. 1784"	lb.	—	.09¾
"No. 2457" (c.l.)	lb.	—	.04
"No. 2718" (c.l.)	lb.	—	.04
"pHR"	lb.	—	1.25
"Resin No. 1226"	lb.	.31½	.36½
Resorcinol (dlvd.)	lb.	—	.64
"Rio Resin"	lb.	.43	.45
"Santocel"	lb.	—	.50
"Sublac"	lb.	.39	.45
"Synpep N" (druma)	lb.	—	.54
"Thiokol LP-2"	lb.	—	.85
"LP-3"	lb.	—	.95
"Tysonite"	lb.	.21½	.22¼
"Vinsol Resin"—Lumps	lb.	—	.06
Pulverized	lb.	—	.06

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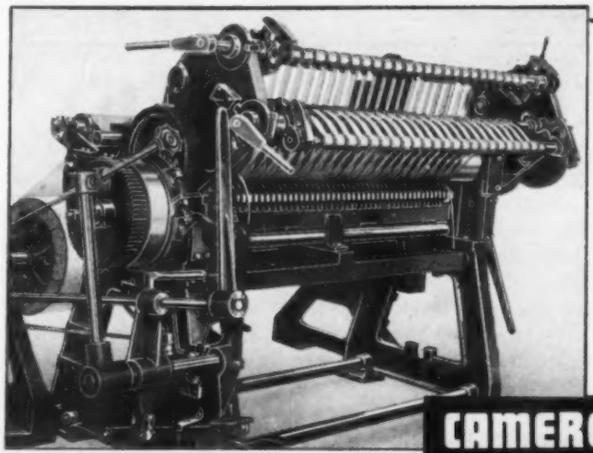

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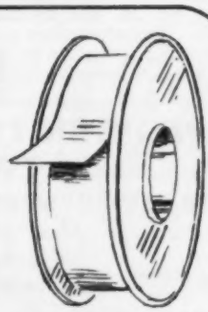

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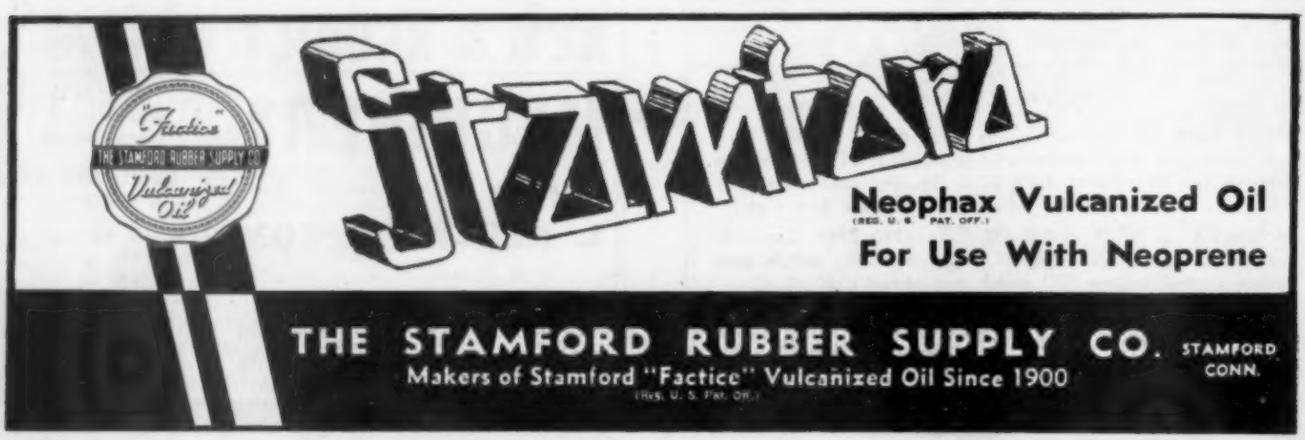

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